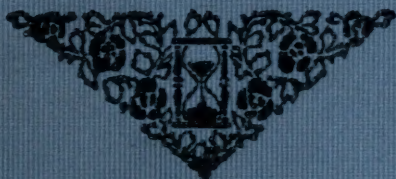




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SCIENTIFIC HANDWRITING

∴ CHAS. T. LUTHY ∴





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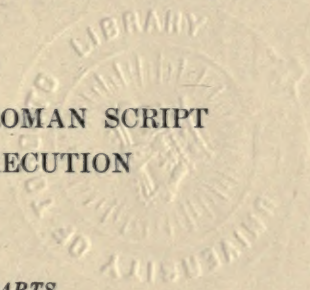
Luthy, Charles T

(LUTHY'S)

SCIENTIFIC HANDWRITING

BEING

AN ANALYSIS OF ROMAN SCRIPT
FORM AND EXECUTION



IN THREE PARTS

- I. EXECUTION
- II. THE BASIC PARTS OF THE LETTERS
- III. THE STRUCTURE OF THE LETTERS

*"The work is a revelation and must give to the world
the correct handwriting for all time."*

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PEORIA, ILL.



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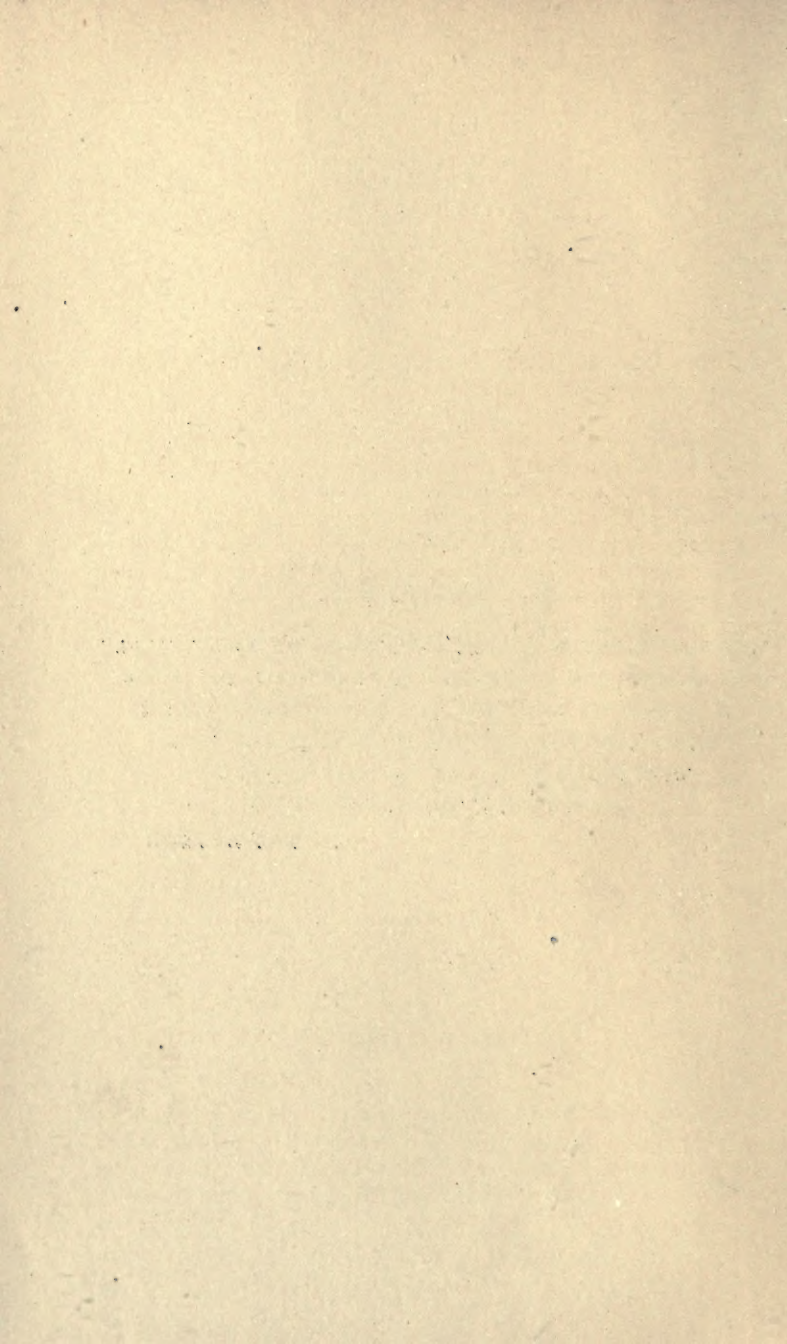
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TO

His Beloved Wife

WHO DURING TWENTY YEARS' INVESTIGATION SO CAREFULLY
COMPARED THE DIFFERENT REVISIONS OF HIS FOUR
MANUSCRIPTS WITH HIM, AND WHO ASSISTED HIM IN
MANY OTHER WAYS, THIS TREATISE, PRODUCED
WITH SEVEN YEARS OF THOUGHT AND LABOR,
IS GRATEFULLY INSCRIBED
BY THE AUTHOR



ENDORSEMENTS

From Geo. U. Rose, Jr., Chief of Engraving Division,
Bureau of Engraving:—

“The work shows that its author has discovered new scientific principles of handwriting. These principles apply whether the writing is slant, vertical, or backhand.

“The work reduces each of the fifty-two letters, capital and small, to a geometric form, resolves such forms into their basic parts, or lines, and reduces the lines to an intelligent system of principles.

“In the investigation of execution, the work resolves the composite movements into their component factors, the actions of the fingers, hand, arm, etc., it traces the cause for the slant to a natural unilinear action, that is alike in all persons, and thereby establishes the natural slant or direction for handwriting. The work then formulates movemental exercises that correspond, in direction and form, with those described by the naturally correct actions and with the basic parts of the letters. Consistent practice on such exercises should therefore confirm correct movement into a life habit.

“This work explains and defines every letter, every part, and every line, together with position, how to hold the pen, and movement, specifically and intelligently, so that the promulgation of the work will enable schools to teach handwriting correctly and universally alike.”

From the late Dr. A. S. Draper, President, University of Illinois, and afterwards Commissioner of Education of the State of New York:—

“I have examined with constantly growing interest your work upon the Roman Script letters. The labor which you have put into this work is evidently prodigious, and is characterized by a thorough knowledge of principles. You have reduced all of the letters of the alphabet to script forms in exact compliance with geometric

principles. I have never known this to be attempted before, but you have evidently done it with completeness. In other words, you seem to have reduced penmanship to an exact science and raised it to the plane of intelligent study. In doing all this I cannot but feel that you have rendered a great service to education, and I trust that your work will be widely extended."

From an Ex-President of the National Education Association, and at one time a teacher of penmanship:—

"After seven years of careful investigation Mr. Chas. T. Luthy has analyzed the Roman Script letters in conformity with movemental, visual, and geometric principles. He has reduced the art of penmanship to a science, established its basic principles, and elevated the method of acquiring it to the dignity of an intelligent study. The work during these seven years has been one of original investigation and the results are wonderful. Henceforth this work must be the authority in writing as the dictionary is for spelling."

From Horace G. Healey, Editor Penman's Art Journal, long the leading authority on penmanship, but whose publication has been discontinued:—

"Mr. Chas. T. Luthy has analyzed the art of handwriting according to movemental, visual and geometric principles. As the letters are made by hand they are movemental, as they are perceived by the sight they are visual and as they are regular forms they are geometric; but what these principles are and how they apply he seems to be the first to discover.

"As the circle and square have evolved as simple geometric forms, so he shows that the basic parts of the letters have evolved as movemental, visual and geometric composites, or chirographic forms, and, as such, must endure as long as man writes. He has reduced the letters to exact geometric forms and execution to correspond. He explains and defines every letter, every part and every line, together with movement, position and how to hold the pen, intelligently and specifically, so that every teacher and every scholar can understand them and all can learn them naturally and alike. The work is a revelation and must give to the world the correct handwriting for all time."

PREFACE

When the author had the immediate supervision of the office of a jobbing house at Peoria, doing business over some six or eight states, as he had had large clerical experience, the constant breaking-in of young people, fresh from the schools, strongly impressed him with their deficiency in handwriting.

On one occasion the author's assistant had a young lady, that wrote nicely, copy something. It was known in the office that the author expected neat and careful work. Therefore, when he stepped over to the young lady's desk to examine a finished sheet, she embarrassingly said: "Mr. Luthy, I am ashamed to have you look at my writing; I never could make a capital 'I.'" The author replied: "You need not be embarrassed; I'll show you how to make it." Then the author, on the spur of the moment, crudely dissected the letter, and showed her how to compose it, part by part, when, in not to exceed sixty seconds by his stop-watch, she repeatedly made a well-nigh, perfect letter.

This greatly surprised the author, and it thereupon occurred to him that if so dissecting the capital "I" will enable one quickly to learn to make that letter, the dissecting any other letter into *clearly comprehensible parts* should likewise enable a pupil so to learn to make such other letter. As the idea recurred to the author, again and again, he sportively dissected other letters in the same crude manner.

One day he so dissected the capital letter "P," when it occurred to him that the upper right part (the curve from the top down to the center) consisted of the right half of an upright oval; that the lower half of the letter consisted of the lower half of an oval; and that the upper left part consisted of the upper left quadrant of an oval. The author then completed the ovals by making that part of each of the three that did not enter into the letter with dotted lines. The ovals thus hastily drawn were very crude, of course; but it seemed to the author that *when understood*, such ovals will be found to be exact geometric forms, and that this must be true of the component parts of all of the letters.

The author, therefore, concluded to analyze all of the fifty-two letters, capital and small, into their basic, geometric parts, thinking that it would take sixty to ninety days. It took *seven years*, the result being an original, scientific investigation of Roman script both as to form and execution.

Although five hundred million Europeans write in Roman script, and it has been taught in their schools for centuries, if a search in the Congressional, the New York and the Boston libraries is a fair criterion, not a letter has ever been scientifically analyzed, not a part has been geometrically defined, and the correct slant (or directionality for handwriting) has not, heretofore, been established; and execution is understood no better.

It is, therefore, hoped that the promulgation of this work will enable schools, all over the world, to teach handwriting intelligently, systematically, and correctly.

INTRODUCTION

At first, people spoke the same tongue and used the same kind of visual characters to represent ideas,—hieroglyphics,—pictures of birds, beasts and of other objects. As tongues multiplied, the styles of the graphic characters multiplied, and, gradually, varied into a running form; then, to facilitate execution further, arbitrary signs were devised; and, in time, chirographic systems, as for example, Roman script and *Die Deutsche Schrift*, evolved.

Some years ago, postal statistics showed that of the eleven billion letters, which at that time passed through the world's mails in a year, eight billion were addressed in English; and as of the other three billion a large percentage were addressed in French, Spanish and Italian,—that also write in Roman script,—this seems destined to become the world's writing.

As the script letters are made by hand, as they are perceived by the sight, and as they are regular forms, latent impulses so asserted themselves in the evolution of Roman script that its forms developed in conformity with the principles of movement, vision and geometry—the elements that constitute the principles of chirography. What these principles are and how they apply will be considered under the three parts: I. Execution; II. The Basic Parts of the Letters; and III. The Structure of the Letters.

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SCIENTIFIC HANDWRITING

1. To be a good penman, the writer must have in his mind the ideal letter, he must have a thorough knowledge of the structure of the letter, and he must have the ability to execute it. How to acquire these three things will be the aim of this treatise to show.

2. That the foregoing must be learned, before anyone can become an accomplished penman, will appear when the process of learning to write is resolved into its several steps, viz.:

A boy at school sees, for his first time, the capital letter *H* on the black-board. He takes it into his mind through his eyes, and by this act of perception there is impressed on the boy's memory an image of the letter, which image he can afterwards recall. While sitting at home, in the evening, the boy tries to make the letter. He recalls the image. He sees it in his mind as he first saw it; but when he begins to compose the letter, part at a time, as he only can, he finds out that he does not know how the parts are formed. He has in his mind only a general impression of the letter as a whole and not of its parts in detail.

3. If the boy, while seeing the letter on the black-board, had *attentively analyzed* every part and every line, until he had obtained a clear conception of their exact shapes, sizes, positions, relations, etc., the boy could now, as he needs it, reproduce in his mind an image of all these particulars.

4. Again: When the boy begins to write, he brings into use a lot of executive machinery, and he wonders how to hold and use the pen, the hand, the arm, etc. Here, also, his ability fails him, as he has had no experience with them.

5. The subject will be unfolded in this treatise under the three divisions; viz.: I. Execution; II. The Basic Parts of the Letters; and III. The Structure of the Letters.

PART I

EXECUTION

1. The factors that essentially contribute to execution in handwriting, are as follows: First, the Desk; Second, the Paper; Third, the Ink; Fourth, the Pen; Fifth, the Penholder; Sixth, the Right Hand; Seventh, the Arm; Eighth, the Body; Ninth, the Action of the Members; Tenth, the Movements; Eleventh, Movement Practice; and Twelfth, the Method to be Followed in School.

First. The Desk

2. The points of importance in the desk are: (1) The Shape; (2) The Size; (3) The Height; and (4) The Slope.

3. (1) *The Shape.* The desk should be of the shape of a parallelogram, longer from left to right, or of a square. The student must place the paper and his hand, arm, and body, in correct positions, and the cardinal lines of such a shaped desk will give him correct bearings therefor.

4. (2) *The Size.* The desk should be large enough for both arms to rest comfortably thereon. Laterally, the paper must admit of being conveniently written upon without having to be moved, and without the body having to be placed into an uncomfortable position. In a forward direction, the paper must admit of being moved far enough so that the muscle of the right arm can rest on the

desk, and yet the lowest line be conveniently written upon. Beginners should not be cramped for room as that leads to habitual incorrect positions of the hand, arm, and body.

5. (3) *The Height.* The desk should reach a little higher up than to where the elbow naturally hangs when the forearm extends forward at right angles to the upper part of the arm. The desk must be a rest for and support the weight of the arm. If it is too high, it injuriously forces the shoulders and the spine out of correct positions, and strains some of the muscles; if it is too low, it causes stooping. This applies whether standing or sitting.

6. (4) *The Slope.* The desk should slope from top to bottom but not laterally. The reasons therefor are as follows:

7. (a) The writing is correctly viewed when it lies in a plane at right angles to the line of sight. The upper part of the desk should, therefore, be raised so as to bring the paper nearer into such a position; otherwise the writing will be too much distorted.

8. (b) Until after the prime of life, the eyes focus, normally, at about fourteen inches distant from the eyes. They accommodate themselves to different distances but that is where the object can be most easily viewed, and constantly continued focusing, nearer or farther (particularly nearer), affects the eyes injuriously. A level desk, that is the right height at the bottom, brings the object not near enough at the top for the eyes.

9. (c) As the left hand holds the paper above the horizontal line of writing, that places the left elbow up on the desk beyond its nearest line, and away from the body. As the elbow rises when it moves away from the body, the farther away from the body that the place is, on the desk, where the elbow rests, the higher, therefore, must

this part of the desk be elevated above the point where the elbow naturally hangs when the forearm extends forward at right angles to the upper part of the arm. A disregard of this tends injuriously to pose the shoulders at unequal levels and to curve the spine laterally.

Second. The Paper

1. The points in the paper, which are closely related to the subject of this treatise, are: (1) The Shape of the Paper; (2) the Position of the Paper; (3) The Underlying Surface; (4) Color; and (5) Ruling.

2. (1) *The Shape of the Paper.* The sheets should be rectangular. The student must place his arm and body in correct positions, relative to the paper, and this shape will give him the best bearings therefor.

3. (2) *The Position of the Paper.* The Paper should lie on the desk so that the corresponding sides of the desk and of the paper are parallel. This has a like tendency as the foregoing, and aids in forming correct ideas of parallels, and of their order, harmony, and beauty. It also permits the writing to be done, from left to right, on a horizontal level. The paper, as to its position from front to rear, and laterally, *must be placed to suit the arm.*

4. (3) *The Underlying Surface.* The underlying surface should neither be too hard, too soft, nor rough or uneven. All these tire and lead to bad habits. A dozen thicknesses of the paper, or a few thicknesses upon a firm, smooth blotter make a good backing.

5. (4) *Color.* White paper presents the greatest contrast with the ink, and, therefore, brings out the writing more plainly. This makes it easier to read and easier on the eyes. The paper should not be glossy.

6. (5) *Ruling.* Ruling for the student's use is of two kinds, ordinary and extraordinary. The former consists

of single horizontal lines, used to write upon. In after life, the student will write almost wholly upon paper so ruled and upon paper not ruled. He should, therefore, early learn to accommodate himself to write upon both kinds. If he practice wholly on ruled paper, he will acquire the habit of depending so largely upon the lines that he will be almost helpless when obliged to write on unruled paper. This must be avoided, and the harder it is for the student to write on unruled paper, the more he should practice thereon and the greater must be his care to follow, precisely, the imaginary, straight, horizontal line.

7. Extraordinary ruling embraces all other kinds of horizontal lines, and of perpendicular, oblique, etc. The object is to produce a *permanently* better writer, not simply to produce *temporarily* better writing. As all this kind of ruling must sooner or later be dispensed with, only such ruling should be used, and only so long, as will be for the student's permanent good.

8. There are three ways in one of which the student must be helped in learning to write, if he can be so helped at all, by such ruling; viz.: (a) In making the letter; that is, in the movement. (b) In his conception of the letter as a whole; that is, in fixing the ideal in his mind. (c) In his analysis of the letter; that is, in obtaining a correct understanding of the structure of the letter.

9. (a) It will be seen, under movement practice, that its object is to perfect (that is, to smoothen) the movement within, and to perfect it (that is, to enlarge its range) without. The lines cannot assist the student to extend the reach, nor to smoothen the movement within, unless it be by forming a *habit* of moving uniformly, to a certain height or breadth, or in a certain direction. But when this is aimed at, the best results can be obtained when the

characters, in size and form, outline the desired movements and are traced.

10. (b) Ruling does not assist in fixing in the mind an image of the letter as a whole. The ideal should consist only of what belongs to the letter itself, and not of the letter and of extraneous lines.

11. (c) Rulings that indicate to the sight the divisions of the letters into their component parts, and the places where the parts join, will help the student more quickly and better to apprehend and to understand the structure of the letters and their component parts, as well as the beautiful structural harmony that underlies the alphabets.

Third. The Ink

1. In selecting ink, three qualities must be considered; viz.: (1) Color; (2) Consistency; and (3) Durability.

2. (1) *Color*. Black ink presents a greater contrast with the paper than any other color, and, therefore, brings out the writing more clearly. This makes it easier to read and easier on the eyes. Eyes are worth preserving.

3. (2) *Consistency*. Ink should flow properly. It should be neither too watery nor too gummy, and it should be free from dust, lint, mould, etc. A small-mouthed inkstand keeps the ink cleaner and prevents rapid evaporation. A fountain inkstand is preferable.

4. (3) *Durability*. Ink should be durable. Formerly inks were common whose writing, when exposed to light, would fade and even vanish. None of the standard inks now in general use, however, are open to this objection.

Fourth. The Pen

1. The steel pen is in such general use that its explanation will suffice for the consideration of this topic. It

will be treated as follows: (1) The Construction of the Pen; (2) The Offices of the Different Parts; (3) The Points of the Pen; (4) The Stiffness of the Pen; and (5) Fancy Pens.

2. (1) *The Construction of the Pen.* The typical pen is made of an elongated piece of thin sheet steel which curves down at the sides and tapers, in breadth, from some distance back to a point in front. The tapering part has a slit running centrally forward to the point, dividing the tapering part into two equal nibs. The rear end of the slit is frequently enlarged, and in the rear end of the tapering part there is, usually, on each outside, a small slit running some little distance backward or in toward the center of the pen.

3. (2) *The Offices of the Different Parts.* The steel makes the pen elastic. The slit running forward through the center of the tapering part lets the nibs spread and causes the ink to flow. The enlargement of the slit at its rear end, and the small slits on the sides, make the nibs pliable. The curving down of the sides of the pen facilitates its being held securely in the holder.

4. (3) *The Points of the Pen.* As to their points, pens are known as stub, engrossing and fine-pointed. The latter are the kind generally used. The point, however, should not be too fine, as that tires and leads to dropping the top of the holder down too low. Neither should the point bend down materially, for in pens so constructed the nibs are apt to bind against each other. In a new pen, the point is usually a little oily and should be well wiped off, otherwise the ink will not adhere nor flow properly.

5. (4) *The Stiffness of the Pen.* The pen should not be too stiff, as that tires and leads to holding it too tight. The constant use of hard pencils is, for like reasons, very injurious.

6. (5) *Fancy Pens.* Fancy and expensive pens are unnecessary. Let the scholar write with the pens that his parents are able or willing to buy, or that his teacher selects. A good writer can write well with an ordinary pen, and in an emergency can write with a stick; but a poor writer can not be made to write well by simply giving him a fancy or costly pen. The fault lies with him and not with the pen.

Fifth. The Penholder

1. The penholder will be considered as to: (1) The Shape; (2) The Length; (3) The Thickness; (4) The Hardness; and (5) The Socket.

2. (1) *The Shape.* The penholder should be straight and round. The pen is held right side up, and this shape admits it to be so turned with the greatest facility. The holder may taper towards the upper end.

3. (2) *The Length.* The penholder must reach above the third joint of the first finger so as to have a good pivotal bearing. Greater length is not objectionable, unless its length be in the way, or make the holder top-heavy. Too short pencils cannot be held in correct writing position and lead to habitual bad holding of the pen.

4. (3) *The Thickness.* The penholder should be of suitable thickness. If too thin, it tires and tends to cramp the hand; if too thick, it interferes with the action of the fingers.

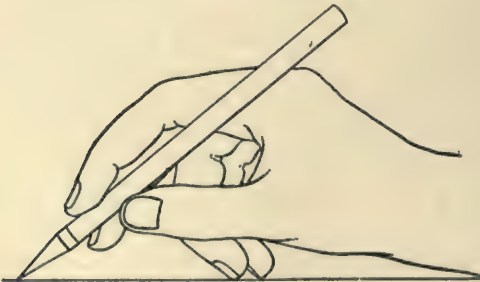
5. (4) *The Hardness.* The penholder, or, more particularly, the tip, should not be too hard, as that tires and leads to holding the pen wrong. Metallic tips are too rigid. All things considered, a gutta-percha holder or tip, if properly made, is probably the most desirable.

6. (5) *The Socket.* The socket in which the pen is held must be true; that is, it should hold the pen straight in line with the holder. Its diameter, or its curvature laterally, should correspond with that of the pen, and it should be large enough to hold the pen rather loosely. The socket must not hold the pen so as to pinch its nibs. A gutta-percha holder should occasionally have its tip soaked in water, the plug in the socket taken out and the ink thoroughly washed out of the socket.

Sixth. The Right Hand

1. The consideration of this important part of the executive machinery will be divided as follows: (1) The Hand; (2) The Second Finger; (3) The Thumb; (4) The First Finger; (5) The Third and Fourth Fingers; and (6) How to Hold the Pen. The fingers are arranged in the order of their relative importance.

(1) THE HAND



2. This topic subdivides into: (a) The Writing Position; (b) The Resting Position; (c) Extension; (d) Position, Laterally; (e) Position, Vertically; (f) Contact with the Paper; and (g) Relaxation.

3. (a) *The Writing Position.* The hand is in writing position when the pen is lowered so that its point touches the paper. The surface of the paper is the plane of writing.

4. (b) *The Resting Position.* The hand is in resting position when the pen is lifted off the paper and the hand assumes its restful attitude as it does in the brief intervals between writing.

5. (c) *Extension.* With regard to extension there are three writing positions of the hand; viz.: 1st. The extended position, when the fingers are in extension; that is, at their greatest reach. 2d. The retracted position, when the fingers are in retraction; that is, drawn back to their limit. 3d. The medial position, when the fingers are extended midway. The hand should be in medial writing position when the point of the pen is on a line passing horizontally through the bodies of the short small letters at half their height. This is the median line. The pen should reach with equal facility as far above as it can be retracted below the median line. Continued writing in a retracted position and "pinching" the holder cramp the hand. Too thin a penholder has, to a less degree, a like tendency.

6. (d) *Position, Laterally.* The hand must be straight in front of and on a straight line with the arm, and at right angles to the horizontal line written upon. The hand, at the wrist, must move freely to both sides.

7. (e) *Position, Vertically.* The top of the hand should tilt to the right, just enough, so that the top of the penholder will neither lean to the right nor to the left. The nibs of the pen must press equally on the paper. The penholder must, therefore, lie in a vertical plane at right angles to the horizontal line of writing.

8. (f) *Contact with the Paper.* The hand should not touch the paper anywhere except with the third and

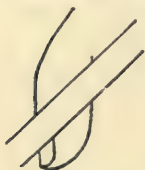
fourth fingers. The ball of the hand should not be used as a pivotal rest. (See Hand, page 10.)

9. (g) *Relaxation.* All the muscles, cords and joints of the fingers, hand and arm should be relaxed. Every part of the body should be relaxed; tension, anywhere, tires and causes to hold the pen too tight.

(2) THE SECOND FINGER

10. This finger dominates the finger movement, and requires consideration as to: (a) Contact with the Penholder; (b) Contact with the other Fingers; (c) Its Joints; and (d) Its Office.

11. (a) *Contact with the Penholder.* The second finger has the holder resting against it on the side towards the first finger, opposite the nail, in the hollow of the first internode. This position provides a fleshy cushion for the holder to rest against and gives the correct range.



12. (b) *Contact with other Fingers.* The second finger should not touch the third finger, except lightly back of the second joint of that finger; neither should it touch the first finger, unless it be lightly towards the latter's point. It must be free to move. (See Hand, page 10.)

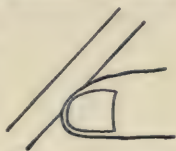
13. (c) *Its Joints.* The finger must be gracefully curved upward and must be bent decidedly more at the second joint than at the first. The joints must be kept perfectly elastic.

14. (d) *Its Office.* The second finger carries the penholder, and directs the course of the up and down stroke in the finger movement, as will be fully explained in the sequel of the treatise.

(3) THE THUMB

15. The thumb, if correctly used, is the most helpful, if incorrectly used, is the most pernicious factor in the finger movement. An apparently slight mistake in the thumb may ruin the movement. The thumb, therefore, needs careful study, and will be considered as follows: (a) Contact with the Holder; (b) Its Position Relative to the Second Finger; (c) Its Position, Horizontally; (d) The Three Sections of the Thumb; (e) Elasticity of the Joints; and (f) The Office of the Thumb.

16. (a) *Contact with the Holder.* The thumb touches the holder with its inside upper point, close to but not with the nail. The thumb bears upward, and over to the right. It must not extend forward over the holder as that rolls the holder



17. (b) *Position Relative to the Second Finger.* The point of the thumb should touch the holder opposite the first joint of the second finger. (See Hand, page 10.) This position gives the greatest range to the fingers jointly.

18. (c) *Position, Horizontally.* The thumb must be kept in a plane at right angles to the plane in which the second finger lies. (See Hand, page 10.) Free movement of the two fingers, *jointly*, cannot be had in any other position.



19. (d) *The Three Sections of the Thumb.* The second section of the thumb should be kept well out to the left from the hand. A line passing centrally over the upper side of the thumb, from the second joint to the first, and continued straight on, should pass a little to the right of perpendicularly up the paper. From this

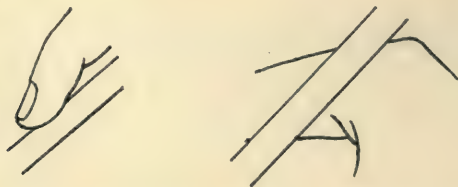
line, the deflection should be about equal from the first joint of the thumb to its point, and from the second joint to the third. No other position gives free movement to all three of the joints and to the second finger. This is very important.

20. (e) *Elasticity of the Joints.* All three joints must be perfectly elastic. The violation of this rule curtails the up and down reach often to the extent of wholly destroying the finger movement. The second finger cannot move when the thumb is stiff.

21. (f) *The Office of the Thumb.* The thumb holds the penholder in position over against the second finger, and up and over against the first finger. It is subservient to the second finger, and its pressure against the holder must, therefore, be very light so as not to interfere with the free action of that finger.

(4) THE FIRST FINGER

22. The points requiring attention in the first finger are: (a) Contact with the Holder; (b) Its Joints; and (c) Its Office.



23. (a) *Contact with the Holder.* The first finger rests with its point centrally over the penholder, a little below the first joint of the second finger; and the holder rests against the thumb-side of the third section of the first finger a little in front of the third joint.

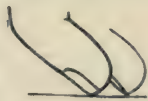
24. (b) *Its Joints.* The second joint should be bent a little more than the first joint, and the finger should be gracefully curved upward, *not dished in at the first joint.* (See Hand, page 10.) The joints must be kept perfectly elastic.

25. (c) *Its Office.* The first finger keeps the holder down in position, provides a pivotal bearing for the upper part of the holder, and furnishes the pressure for shading. Like the thumb, this finger is subservient to the second finger and must not by stiffness nor by pressure interfere with the free action of that finger.

(5) THE THIRD AND FOURTH FINGERS

26. These two fingers do not touch the holder, neither do they participate in the movement of the other fingers. Their relation will be pointed out in the following: (a) Their Position; (b) Contact with the Paper; and (c) Their Office.

27. (a) *Their Position.* These fingers maintain a fixed position relative to the hand; that is, they do not move independently of but only with the body of the hand. They should be kept close together, and should be fairly well curved and bent under the body of the hand. The fourth finger should lie nearer the hand. (See Hand, page 10.)



28. (b) *Contact with the Paper.* The two fingers touch the paper lightly and slide freely over it as the hand is moved. (See Hand, page 10.)

29. (c) *Their Office.* They serve as guides not as rests. They should not be used as a pivotal rest.

(6) HOW TO HOLD THE PEN

30. The consideration of this important topic will be divided as follows (a) Right-handedness; (b) Position, Vertically; (c) Position, Horizontally; (d) Inclination, Lengthwise; (e) Pressure; (f) The Position of the Hand and Fingers; and (g) Loose Holding.

31. (a) *Right-handedness.* The pen should be held with the right hand. As mankind is right-handed, progression in writing, the form of the letters, and the ruling of paper and of books, are adapted to right-handedness. Therefore, the parent, or the teacher, who permits a child to acquire the habit of left-handedness does the child an irreparable injury. The child when first beginning to use its hands and while yet an infant in its mother's arms, should be taught right-handedness. Till that becomes dominant, the babe should be watched and, if necessary, should be carried with its left arm against the mother's or the nurse's body, so that the child will be tempted to put forth and to take hold of things with its right hand.

32. (b) *Position, Vertically.* The pen must be held in a vertical plane at right angles to base line,—the horizontal line written upon,—so that the two nibs of the pen will press equally on the paper and will spread on or along, that is, parallel with, not across that line. The holder at the top must, therefore, lean neither to the right nor to the left.

33. (c) *Position, Horizontally.* The pen should be turned exactly right side up; that is, a line passing centrally through the pen, laterally, should be horizontal. Both nibs should touch the paper squarely.

34. (d) *Inclination, Lengthwise.* The penholder must be held at such an upward inclination, rearwardly, that it will rest against the third section of the first finger a little

in front of the third joint. (See Hand, page 10.) It must not be dropped down on the thumb for two reasons, viz.: 1st. The ink hangs like a drop, as it were, on the under side of the pen, and if the top of the holder is too low, too great an ink surface touches the paper wherefore the upline becomes too heavy. 2d. The position indicated is the nearest to the pivotal point of the action of the fingers in which it is possible to hold the upper end of the holder and still conform to all other requirements.

35. (e) Pressure. The pressure must be very light, and be centrally over, bear straight down on, and be equal on both nibs of the pen. The nibs should press equally on the paper.

36. (f) The Position of the Hand and Fingers. The position of the hand and fingers, in holding the pen, has been described.

37. (g) Loose Holding. The pen should be held very loosely. This is very important as holding it tight affects the nerves, interferes with the finger movement, tires, leads to holding the pen wrong, and cramps the hand.

Seventh. The Arm

1. The right arm will be considered under: (1) Position from Front to Rear; (2) Position, Laterally; (3) Elevation; (4) The Arm's Position to the Writing; and (5) Moving the Elbow.

2. (1) Position from Front to Rear. The arm should be brought forward far enough so that the greater part of the muscle under the arm, between the wrist and elbow, will lie on the desk. The position must be restful.

3. (2) Position, Laterally. Laterally, the arm should be as near the body as it comfortably can be, when beginning the line of writing. As the writing progresses to

the right, this starting position gives to the arm the greatest range and keeps the remote writing nearer the normal eye-focussing distance.

4. (3) *Elevation*. The arm should not hang quite so low as to carry its own weight; neither should it be held so high as to produce tension, nor a lateral bending of the spine. The weight of the arm should rest on the desk.

5. (4) *The Arm's Position to the Writing*. The forearm should be kept at right angles to the horizontal line written upon. If it be turned to the left, it impedes free movement and curtails the arm's range; if to the right, it places the writing too far away from the eyes.

6. (5) *Moving the Elbow*. The elbow must move to the right as fast as the hand moves to the right. If the elbow remain stationary, and the hand, or the hand and forearm, alone, be moved, the writing will be done in a circle.

Eighth. The Body

1. The main points relative to the body are: (1) Its Comfort; (2) Its Erectness; and (3) Its position at the Desk.

2. (1) *Its Comfort*. The body should be in a comfortable position. A strain, anywhere, affects the fingers, hand and arm.

3. (2) *Its Erectness*. The student should sit in an erect position, and the shoulders should be kept on a level and thrown neither forward nor back. Bending the spine laterally, stooping, and craning the neck are injurious. The body should bend forward at the hips, if bending forward is necessary.

4. (3) *The Position at the Desk*. (a) Sit close to, straight in front of, and facing the desk; (b) let the right arm hang close to the right side of the body; (c) raise

the forearm up (the hand extended on a straight line with it) till it is at right angles to the upper part of the arm; (*d*) turn the hand and forearm to the left till the front of the hand is centrally in front of the body; (*e*) turn the left side of the body forward and to the right far enough to bring the forearm and hand at right angles to the horizontal line of writing; (*f*) then bring the hand straight forward far enough onto the desk, so that the greater part of the muscle under the forearm rests on the desk. The body must not touch the desk.

This leaves the hand, arm, and elbow in correct positions, and free to move, and brings the line of sight approximately in line with the *down stroke* of the finger movement—the *naturally correct slant*.

Ninth. The Action of the Members

1. The several writing movements are combinations of the actions of the fingers, hand, and arm, and before treating of the movements, these actions should, therefore, be considered. They are as follows: (1) The Actions of the Fingers; (2) The Action of the Hand at the Wrist; (3) The Action of the Muscle; (4) The Action of the Arm at the Elbow; and (5) The Action of the Arm at the Shoulder.

(1) THE ACTIONS OF THE FINGERS

2. There are three fingers whose actions directly participate in the finger movement; viz.: (*a*) The Second Finger; (*b*) The First Finger; (*c*) The Thumb. They are used only in this ternary combination, not severally, but for their better understanding the action of each will be first considered separately, and then: (*d*) The combined Action of the Fingers.

(a) *The Action of the Second Finger*

3. As the action of the second finger dominates the others it will be considered more fully and as follows: 1st. The action of the Second Joint; 2d. The Action of the First Joint; 3d. The Action of the Third Joint; and 4th. The Slant of the Down Stroke.

4. 1st. *The Action of the Second Joint.* The action of the second joint is free and unilinear like that of a strap hinge. It carries the point of the finger forward and back in the plane in which the finger lies. This joint has no lateral action.

5. As the forepart of the finger carries the pen, the second joint, by its unilinear forward and back action, directs the course of the up-and-down stroke in the finger movement.

6. The point of the finger rises as it extends forward and lowers as it retracts. To keep the pen in the plane of writing, as will hereafter be more fully explained, the up-and-down action of the hand, at the wrist, is brought into use.

7. 2d. *The Action of the First Joint.* The action of the first joint is limited and is like and is auxiliary to that of the second joint.

8. 3d. *The Action of the Third Joint.* The third joint's action is like the others; but it raises the finger, and in addition it has a limited lateral action that is not used in writing.

9. 4th. *The Slant of the Down Stroke.* In writing, the hand is not held exactly in a prone position, but its top is leaned to the right far enough to bring the pen and holder into a vertical plane; this turns the second finger into a plane dipping to the left, which causes the unilinear action of the second joint of this finger to carry the pen,

up the paper, on a slant of about $22\frac{1}{2}^{\circ}$ to the right of perpendicular.

(b) *The Action of the First Finger*

10. The action of the first finger is like and is subservient to that of the second finger.

(c) *The Action of the Thumb*

11. The thumb lies and moves in a plane at right angles to that of the second finger. The action of all three joints is free and easy. The first two have a unilinear action, like that of a strap hinge, that carries the point of the thumb forward and back in the plane in which the thumb lies. The third joint acts like the other two, and, in addition, moves freely up and down. The action of the thumb is subservient to that of the second finger.

(d) *The Combined Actions of the Fingers*

12. There are two combined actions of the fingers, viz.: 1st. The Natural Slant Action; 2d. The Lifting Action.

1st. *The Natural Slant Action*

13. The natural slant action is caused by the action of the second joint of the second finger. The other joints and the other fingers are subservient to it, and must move freely so as not to interfere with the simple, easy, hinge-like, forward and back action of this joint.

14. As the forepart of the second finger rises as it extends and lowers as it retracts, so much of the up-and-down action of the wrist must be brought into use as is necessary to carry the point of the pen in the plane of writing. Care must be taken not to substitute for this

wrist action the up-and-down action of the three third joints, because their combined action is in a back-slant direction, is more complicated, and more laborious. The up-and-down wrist action is also used to some extent, to raise and lower the lateral action of the wrist, when this action is *combined* with that of the fingers, so as to keep the pen in the plane of writing.

2d. The Lifting Action

15. When writing, the hand is put into a writing position; that is, the fingers are somewhat lowered. At every little cessation, however, the pen and fingers are lifted up into a resting position. This lifting up is accomplished by the use of the up-and-down action of the three third joints and of the wrist, and by the auxiliary action of the other joints of the three fingers.

16. The combination of these finger actions and of the lateral actions of the third joints of the first and second fingers, should not be perverted into a finger movement with a lateral range, as that habituates the hand and fingers to a sprawling or twisting movement which destroys the appetency of the fingers to move in their naturally correct, up-and-down, slant direction. The wrist action contributes the lateral range of the finger movement.

(2) THE ACTION OF THE HAND AT THE WRIST

17. The hand, at the wrist, has a bilateral and an up-and-down action.

18. The wrist remains stationary and performs the office of a pivot, while the hand moves to the right and to the left, causing the pen to describe, approximately, the upper central part of a large horizontal ellipse when the hand is in a prone position.

19. However, as in writing, the top of the hand is turned towards the right, that throws the lateral action of the wrist into a plane dipping to the right, which requires the bringing into use of so much of the up-and-down action of the wrist as is necessary to keep the pen in the plane of writing. By the union of this deflected lateral and of the up-and-down action, the movement of the wrist causes the pen to describe, approximately, the upper left quadrant of a large, broad ellipse whose larger diameter is on line with the downslant.

20. The wrist joint should be perfectly flexible. If there is the least tendency to rigidity, it should be overcome by correct and consistent practice.

(3) THE ACTION OF THE MUSCLE

21. The muscle under the arm, between the wrist and the elbow, has no joint and no action of its own. Its office is similar to that of a ball in a ball bearing, and the arm is rolled on it by the writer.

22. The muscle is longer than it is wide, but its range is greater laterally. The limit of its range, therefore, outlines, approximately, a horizontal oval.

23. Within the limit of its range, the action of the muscle has nothing to confine it to nor to guide it in any particular course, and it is, therefore, dependent on the will of the writer for its direction and reach.

(4) THE ACTION OF THE ARM

At the Elbow

24. In the plane of writing, the arm, at the elbow, has only a bilateral action.

25. It moves with facility to the necessary distance to either side of its normal writing position.

26. The elbow remains stationary, and performs the office of a pivot, while the forearm moves to the right and to the left, and causes the pen to describe the upper curve of a circle. The arm, in writing, moves only enough at the elbow, in an up-and-down direction, to bring the action of the shoulder into use so as to keep the pen in the plane of writing.

(5) THE ACTION OF THE ARM

At the Shoulder

27. The arm, at the shoulder, has a forward and back and a dextral and return action. Neither of them, however, are of much use in writing without the assistance of the action of the elbow.

28. (a) The forward and back action is free and easy. The arm hangs from the shoulder and moves like a pendulum, its own weight keeping the forearm at its lowest point. It has that, slightly to guide it in a straight line forward and back; but it rises and lowers, and to counteract this the action of the elbow is brought into use.

29. (b) The dextral action raises the arm. In this, the action is like that of a hinge, the elbow rising as it moves dextrally away from the body, and to counteract this, the action of the elbow is brought into use. It is the dextral action that moves the arm to the right in writing.

30. The normal position of the elbow is at the side of the body. The writing should, therefore, begin near the body and progress to the right.

Tenth. The Movements

1. A movement, in writing, consists of such a combination of actions as will give to their combined and separate operations command in all directions. There

are five movements; viz.: (1) The Finger Movement; (2) The Muscle Movement; (3) The Muscle and Finger Movement; (4) The Arm Movement; and (5) The Arm and Finger Movement.

(1) THE FINGER MOVEMENT

2. The finger movement combines the action of the fingers with the action of the wrist, and they combine so smoothly that it requires close observation to detect their delicate blending.

3. The action of the fingers is unilinear, and, therefore, adapted only to up-and-down lines; but their action is complemented with the bilateral action of the hand at the wrist, and the two, separately and combined, give to the finger movement command in all directions.

4. The action of the second joint of the second finger raises its forepart as it extends, and lowers it as it retracts. To keep it, or the pen, in the plane of writing, as much as is necessary of the up-and-down action of the wrist, as has been stated, is brought into use.

5. The finger movement is the smallest in range but it is amply large enough for all ordinary writing. Its reach is greater in the perpendicular direction, which is also the greater dimension of the letters, or of the parts that compose them. It moves with the greatest rapidity and with the greatest precision.

6. The finger movement is suitable for all ordinary writing and, because of its rapidity and precision and because of the fixedness of the direction of its down-stroke, it is peculiarly, and the only movement that is, adapted for the small letters because of their diminutiveness and of the straight, downslant lines with which they abound.

7. There is no one action in a vertical direction. To produce a vertical stroke, so much of the lateral action of the wrist and of the lifting action of the fingers must be united with the forward and back action of the fingers as will, with their joint operation, produce it; or the hand at the wrist or the arm at the elbow must be turned to the left. The last two are not natural and the first abandons the fixedness of the downstroke which is so advantageous in the finger movement.

(2) THE MUSCLE MOVEMENT

8. The rolling of the arm upon the muscle, as heretofore described, constitutes the muscle movement. Only so much of the actions of the arm at the elbow and shoulder are brought into use as is necessary to utilize this rolling motion of the muscle.

9. In range, this movement is the next larger to the preceding, and it is easier in its vertical but greater in its horizontal reach, varying somewhat in different persons.

10. Unlike the finger movement, this movement has nothing within its limit to cause it to move in any particular direction, and without such fixedness in its course, it is not at all adapted to make straight lines running uniformly in the same direction.

11. The shape of the muscle, as a bearing, makes it most suitable for describing rather large ovals; and the muscle movement, therefore, has its best adaptability to very large capital letters and to flourishes which abound in large ovals and their parts.

(3) THE MUSCLE AND FINGER MOVEMENT

12. The muscle and finger movement is a combination of the preceding two movements, the two operating simultaneously.

13. Its range is but slightly larger than of the muscle movement alone.

14. This combined movement partakes principally of the peculiarities of the muscle movement.

(4) THE ARM MOVEMENT

15. The arm movement combines the simultaneous actions of the elbow and shoulder. It has no rest for the arm and it is, therefore, a free arm movement.

16. The range of this movement is very large, extending to the easy reach of the arm. It is greater in its horizontal range.

17. The third and fourth fingers may or may not touch the paper.

18. With the aid of the elbow, the dextral action of the shoulder adapts the movement for making long, straight, horizontal lines; the pendulum-like forward and backward action of the shoulder adapts it for making long, straight perpendicular lines; and the union of both adapts it for making large circles and ovals. The movement for its direction, is almost wholly dependent on the will of the writer.

19. As its machinery is heavy, its range very large, and as it has no fixedness of direction, the arm movement is not possessed of such rapidity and precision as to adapt it well to characters so small as those of ordinary writing.

(5) THE ARM AND FINGER MOVEMENT

20. The arm and finger movement is a combination of the arm movement and the finger movement, the two operating simultaneously.

21. Its range is very large, and the greatest of all the

movements, although but a trifle larger than that of the arm movement alone. The movement partakes principally of the peculiarities of the arm movement.

Eleventh. Movement Practice

1. This topic will be considered under: (1) The Object of Practice; (2) Habit; (3) Care and Thought; (4) Correct Movement; (5) Size and Form of the Characters; (6) Movemental Exercises; and (7) Shading.

2. (1) *The Object of Practice.* The object of movement practice is to acquire the *habit* of correct movement.

3. (2) *Habit.* Continued practice on a certain thing wears in one a *groove* in which he does that thing; that *groove* is *habit*.

4. That which to the student seems awkward and uncomfortable, at first, if consistently persisted in, will in a few days feel easier, in a few weeks feel comfortable, in a few months be a *habit*, and in a few years will be so confirmed, that, if only let alone, it will cling to him through all his after life.

5. (3) *Care and Thought.* At first the student is *at sea*. He has no *groove*, to start with, in which to move. Practice wears the groove. Therefore, the student *must begin right and must keep on right*. For a long time every motion should be slow, careful and thoughtful; the least error may swerve him from the path of duty.

“A pebble in the streamlet scant,
Has turned the course of many a river;
A dew drop on the infant plant,
Has warped the giant oak forever.”

6. Hurry ruins good penmanship. Acquire the habit of writing slowly, carefully and thoughtfully. The one

who writes so will have nothing to undo, his work will be better, and he will have more work done, *in value*, at the close of day. Whatever you do, do well.

7. The more the student practices, if he do it right, the better will be his writing. If he do not improve, something is wrong. If the student go wrong he should stop short, begin right, and keep on right. It is hard to overcome a bad habit. Some never overcome it. They *will* not.

8. (4) *Correct Movement*. Movement, to be correct, must be perfect without and perfect within. It must be capable of full reach and be smooth and easy within the whole of the reach. There must be no pain, no discomfort, no tension anywhere.

9. (5) *Size and Form of Characters* As the movements are combinations of actions that have fixed or favorite directions, the lines described in practice must correspond in length and direction to the reach and course of the actions severally; otherwise the practice will destroy or injure the movement.

10. There are three actions with perpendicular reach; viz.: 1st. The natural slant action of the fingers; 2d. The muscle action; 3d. The arm action. And there are four actions with horizontal reach; viz.: 1st. The wrist action; 2d. The muscle action; 3d. The elbow action; 4th. The shoulder action. It is well to remember these; they serve as an index to the size and form of the lines, or characters, to be practiced on.

11. (6) *Movemental Exercises*. The finger movement should receive much careful, consistent practice. It combines the natural slant action of the fingers, which lies in the downslant direction, with the action of the wrist, which lies in a lateral direction. By the joint and several operations of the two actions, the movement possesses command in all directions. Let the characters be not too

large at first and gradually enlarged. The exercises for practice should embrace the following:

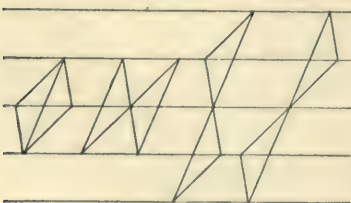
12. (a) *Finger Action Alone.* In this the lateral wrist action does not combine and the up and down wrist action only enough to keep the point of the pen in the plane of writing.

A $22\frac{1}{2}$ degree, downslant line, up and down on same line. The up and down action wrist combines, otherwise the wrist and arm do not move.

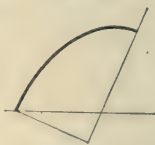
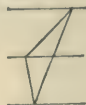
13. (b) *Wrist Action Alone.* Upper left curve as described by the wrist action. To the right and to the left on same line. The lateral and the up and down wrist actions combine. The fingers and arm must not move.

14. (c) *Finger and Wrist Actions combined.* Firstly. Triangle of $22\frac{1}{2}$ -degree downslant, 45-degree upslant, and $9\frac{3}{4}$ -degree backslant lines. The hand rises and lowers slightly at the wrist and moves to the right on upslant, and an equal distance to the left on backslant line, in both simultaneously with the up action of the fingers. The wrist must not move, laterally, on downline. The arm must not move.

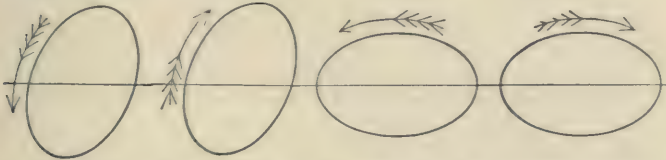
Secondly. Triangle of like slants with the combined action to the left of downline. Actions as in preceding.



Thirdly. Double triangles combining the preceding two. Actions as before.



Fourthly. Ovals. Both downslant and horizontal, downward and upward. Pains must be taken to have both actions operate simultaneously throughout the entire oval. The arm must not move.

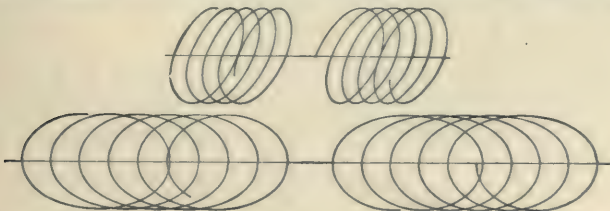


(d) *Finger and Arm Action.* *Firstly.* $22\frac{1}{2}$ -degree downslant and 45-degree upslant lines, connected. The arm moves to the right only on the upslant line and simultaneously with the up action of the fingers. The wrist raises and lowers the hand slightly but must not move laterally.



Secondly. Ovals can be produced with these combined actions, but as the finger and wrist, and the finger, wrist and arm actions are better adapted for the purpose it is not advisable to practice on ovals with only the finger and arm actions.

(e) *Finger, Wrist and Arm Action.* Progressive ovals in positions, directions and actions as under Finger and



Wrist actions, but in addition to the actions there, in the first and third exercise the lateral action of the arm carries the hand to the right on the lower half, and in the second and fourth, on the upper half; otherwise the arm must not move.

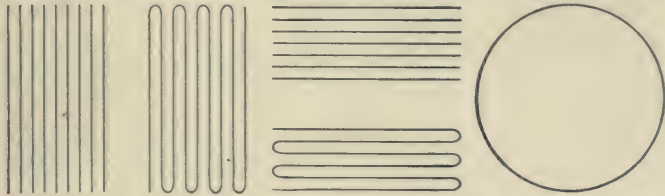
15. (f) *The Lifting Action* of the fingers, in carrying the hand to and from the writing and resting positions, can also be advantageously practiced a little by beginners. It will give flexibility to the joints.

16. (g) *Muscle Movement*. In this the arm is rolled over or on the muscle, and the fingers and wrist do not act. The movement is wholly dependent on the will of the writer for its direction. It has its best adaptability to ovals of which its practice should consist. Practice the ovals and progressive ovals as in the Finger and Wrist action, but the characters must be larger for this movement. Where, for any reason, this movement is substituted for the finger movement, a great deal of time must be spent in practicing on the downslant line, so as to acquire, if possible, a fixedness of habit for the $22\frac{1}{2}$ -degree downstroke. The time can, however, be more advantageously spent in practice on the finger movement, in which the $22\frac{1}{2}$ -degree downslant is *naturally* fixed, and the movement, therefore, especially adapted to handwriting.

17. (h) *Muscle and Finger Movement*. This is a combination of the two movements, the two operating simultaneously, and will in the practice of them, separately, receive much aid. After the finger and muscle movements have been learned, separately, a little time may be spent in learning to combine them smoothly, if for any reason such movement is needed. Ovals and progressive ovals are suitable exercises.

18. (i) *Arm Movement*. With the exception of the

action of the arm to the right, which has been noted as an auxiliary to the finger movement, the arm movement is rarely, and the arm and finger movement is hardly ever used in writing. Time in practicing can, therefore, be more advantageously spent on the smaller movements. The larger movements can be practiced when needed. Long horizontal lines, single and connected, to right and back, aid in developing the action of the arm to the right. Vertical and horizontal lines, single and connected, and circles, and single and progressive ovals are suitable exercises for this movement. Let the characters be very large, the horizontal lines reaching across the page.



19. As the letters consist almost wholly of straight upslant lines, straight downslant lines, and of small part-ovals, too much time cannot be spent on the foregoing simple, *finger movement* exercises, and no others are needed for the development of the *habit* of correct movement. Combinations specially adapted for learning elements peculiar to a single letter, common to groups of letters, or to overcome a peculiar fault in movement, should follow.

20. (7) *Shading*. Write as lightly as possible. This is necessary to obtain the delicacy of touch that is essential to good penmanship. The student should make no effort to shade until he has obtained a facility of execution when correct shading will come to him without effort. Before that, graceful shading is impossible.

Twelfth. The Method to be Followed in School

1. (1) *Must be Logically Correct.* Handwriting is a delicate and complicated process. It consists of many steps, a slight error in some of which may forever prevent a child from becoming a fair writer, and as an erroneous habit is difficult to unlearn, the teaching the process must be psychologically and practically correct, and should be begun the first day a child goes to school.

2. (2) *Explanation Must be Specific in Every Detail.* Although the process is complicated,—consists of many different steps,—each step is simple enough, if it is so clearly and specifically explained that the child will understand it and will know exactly what to do. Illustrations must be used, where necessary, to reach the child's understanding.

3. (3) *The Different Steps Must be Successively Taught.* To begin by placing a pen in a child's hand is absurd. When its attention is *all* drawn onto the point of the pen and onto what it writes, how can it *attend* to all the different steps in position, holding the pen, etc.? As the attention is single—not divided—the child can think of but one thing at a time, wherefore the different steps must be learned successively—*one by one*.

4. (4) *Position and Holding the Pen.* For days, possibly weeks, the child must be drilled on each step of position, until the child automatically assumes the correct position. Then it must so learn to hold a stylus—with no pen point to abstract its attention.

5. (5) *Movement.* When the child is perfectly familiar with these, it must begin movement by tracing forms that correspond with the actions separately, then forms that combine the actions into the movement, and then forms that practice the movement as it enters into the letters.

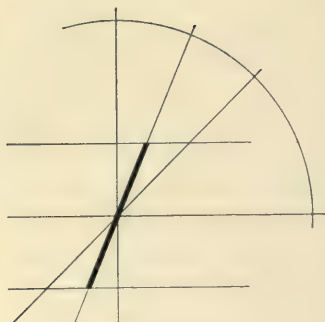
Such tracing must all be done with a stylus so that the child can follow the forms *attentively*. When the child has practiced all this long enough to enable it to do it automatically correctly,—from habit,—the perfect familiarity with such preliminary process will make it easier to learn how to use the pen and how to compose letters.

6. (6) *School Drill in Unison*. As it is impracticable for the teacher to go through all this with each scholar separately, the matter must be so arranged that the whole class, or the whole school, can be drilled *in unison*.

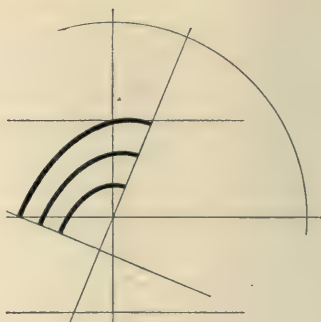
7. (7) *Movement Cards*. This preparatory part of the process will be covered by 12 Movement Cards containing a series of 24, progressive movement exercises, and the necessary directions, explanations and illustrations. After a child has carefully learned the 24 exercises, they should be practiced in serial order, daily for say half an hour,—each form traced 50 to 60 times. When this cannot be done in the school room, the child should practice evenings, at home. The exercises are suitable for all the grades and should be continued long enough to confirm correct movement into a life habit. Every scribe should practice these exercises; when one gets “rusty,” it is surprising how they loosen up and smoothen the movement.

The forms for the 12 Movement Cards follow.

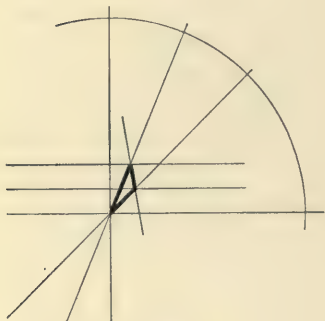
NOTE. *Transition to the Pen and Copy Books*. When perfectly familiar with the stylus and the 24 movement exercises, then for some time the child must practice the exercises with a pen, on blank paper, observing every direction; then the child must go to the copy books. As these are expensive, the head lines should first be written in blank books, carefully and very, very slowly, so as to make the letters perfect in form, as the child is now learning form *by imitation*. Then the child should slowly, carefully and as nicely as possible copy the lines into the copy book. The child should not hurry; speed will come, later, of itself.



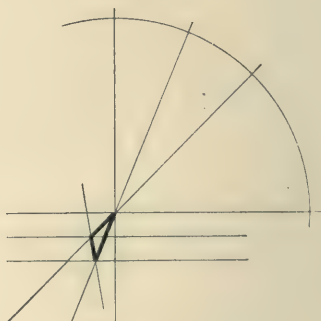
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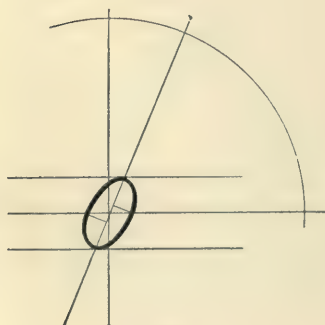
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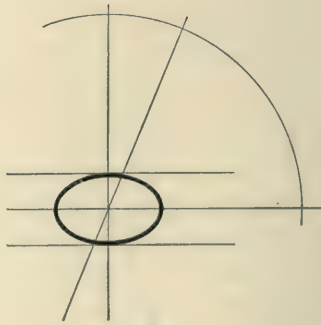
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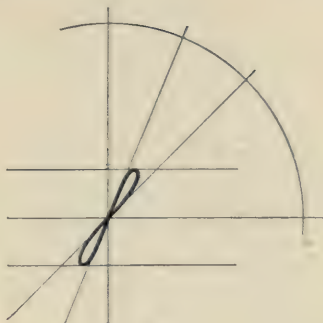
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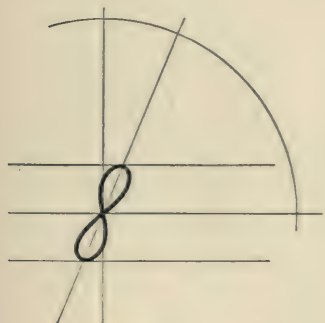
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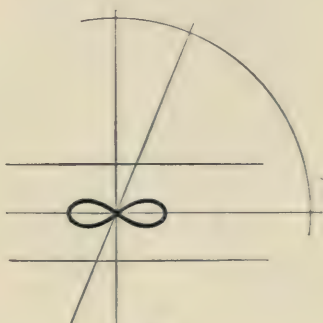
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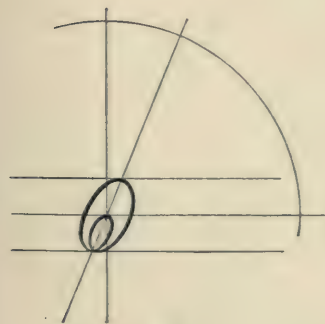
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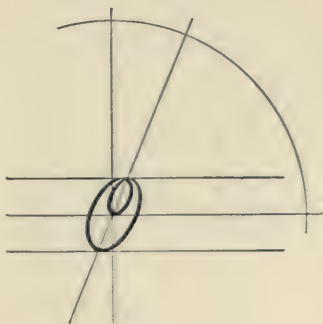
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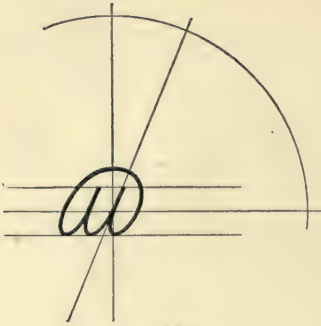
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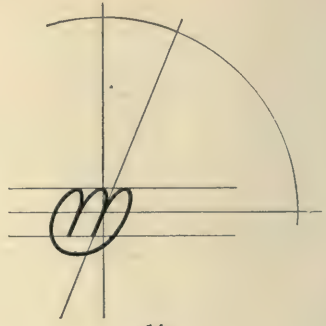
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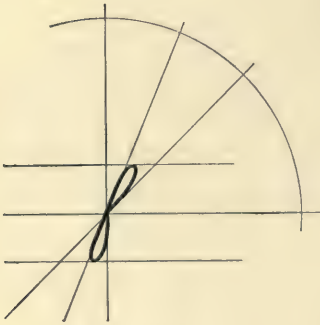
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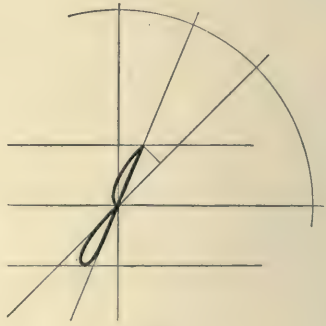
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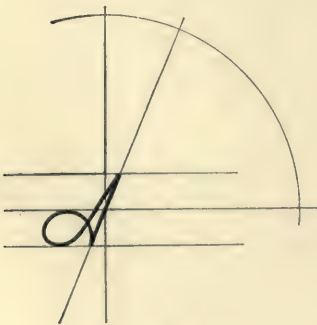
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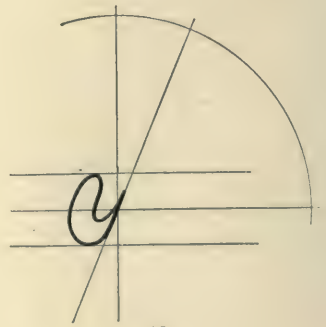
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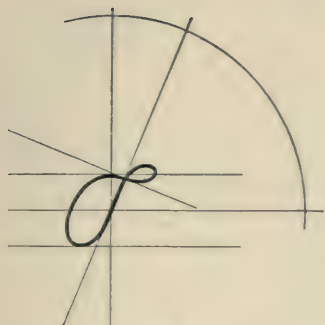
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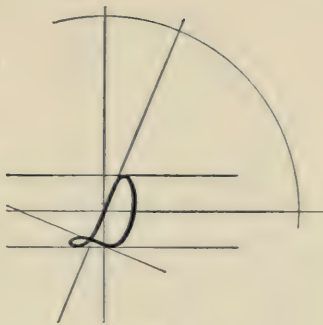
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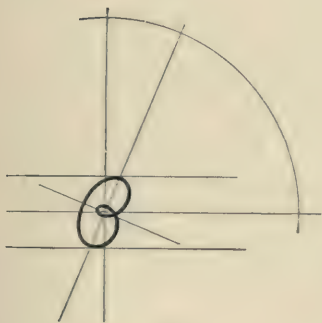
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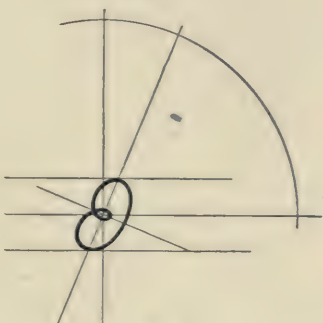
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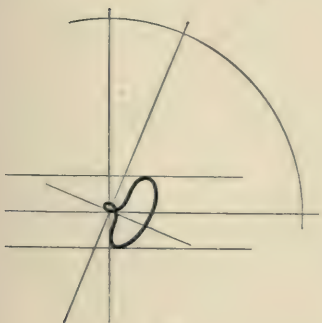
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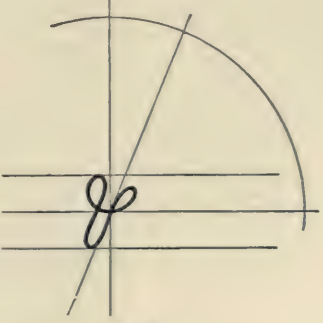
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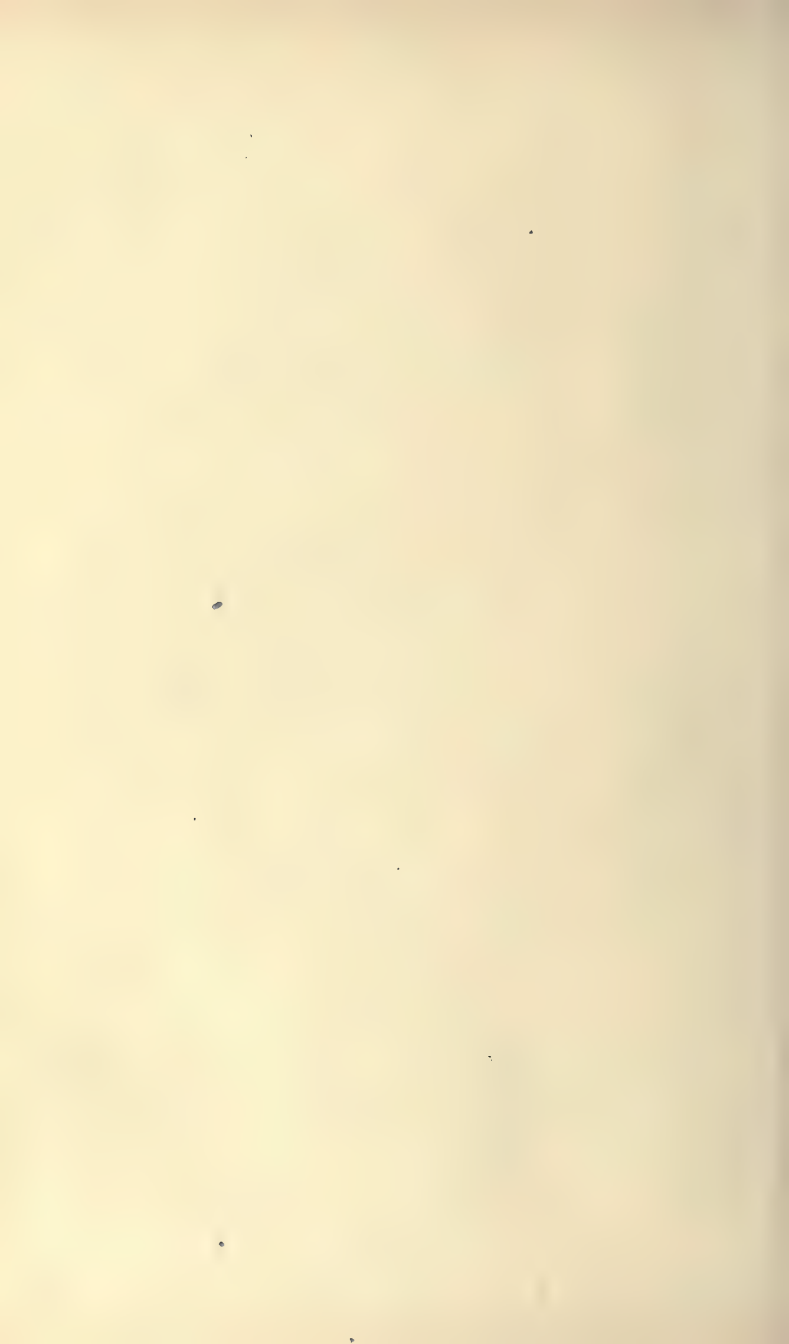
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PART II

THE BASIC PARTS OF THE LETTERS

1. The mental image is a representation within of what the eyes saw without, and writing is the representation without of the image within.

2. The mental steps that take place in this circuitous reproductive process are as follows: 1st. The *perceptive* faculty brings the knowledge of the external letter into the mind. 2d. The *representative* faculty, or *imagination*, makes of it a mental picture, or image, and holds this image up in *consciousness*. 3d. The *elaborative* faculty, or *reasoning* power, takes the letter apart, mentally, or analyzes it into its lines, their lengths, shapes, distances apart, relations, etc. 4th. The *reproductive* (?) faculty takes the mental image, with its appurtenant analytic knowledge, and stores it away in a recess of the mind, the *memory*, where it lies out of consciousness till again brought forth. 5th. When again wanted, the *reproductive* faculty brings the mental image, with its appurtenant analytic knowledge, out of *memory*. 6th. The *representative* faculty, or *imagination*, again holds it up before the mind in *consciousness*, and the letter, as a whole and with its parts, is before the mind as it first was.

3. If the student, at the end of the second step, do not analyze the letter, the fourth step immediately takes place; and then only a vague impression of the letter, as a whole, is relegated to memory, whence that alone can afterwards be recalled.

4. The third step, the analysis or taking apart of the

letter, is a most important one. Writing is its opposite, the synthetic or building up process, and the student gets the form of the parts to build up with from his mind. If, therefore, by an improper analysis he fail to fix in his mind the parts correctly, he will be frustrated in his attempt to compose the letter.

5. The foregoing shows that at least three things are necessary to fix an ideal available in the mind, viz.; *First*. A Perfect External Letter. *Second*. Its Perception through the Eyes. *Third*. Its Apprehension by the Understanding.

First. The Perfect External Letter

1. A letter to be perfect must be perfect in form and perfect in execution. To be perfect in execution, the stroke must be smooth and graceful. This is the accomplishment of manual dexterity which can best be acquired by correct and consistent practice. Perfection in the form of the letters comprehends: (1) Their shape. (2) Their Size. (3) The Basic Parts, or Elements, of which they are composed.

(1) THE SHAPE

2. In shape a letter should be: (a) Uniform; (b) Simple; (c) Correct.

3. (a) *Uniformity*. There should be only one shape for each letter. It is an arduous task for the beginner to learn the fifty-two letters correctly, and his task should not needlessly be made harder. The student can learn to make one shape quicker than two, and much better in the same length of time.

4. Legibility and expeditious execution depend largely upon perfect familiarity with the shape and, therefore,

the fewer shapes there are for any one letter for the mind to get tangled up with, the easier and the quicker the mind can recall to read and to make the letter.

5. Multiformity is carried to an extent that is absurd, as the following shows: The capital letter *F*, for example, is made with no less than ninety-six different stems, the top is made in no less than twenty-two different styles, and there are five or more different styles for crossing it. This gives one hundred and twenty-three different characters that combine to make up ten thousand five hundred and sixty capital *F*'s, all specifically different. Comment is unnecessary.

6. (b) *Simplicity*. The letters should be as simple as possible so that they can be easily learned, easily made, and easily read. As the writing is for the purpose of being read, all embellishments and other redundant parts should be eliminated.

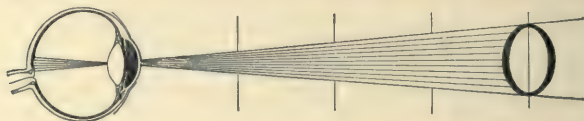
7. (c) *Correctness*. Forms for the letters are established by usage, and back of the multiforms of each letter there is an ideal whose composition accords perfectly with the principles of movement, vision and geometry. These principles will appear, and correct forms for all the letters will be given in the sequel of the treatise.

(2) SIZE

1. The size of the letters will be considered under the following, viz.: (a) The Sight-circle; (b) The Fundamental Square; (c) The Sight-belt; (d) The Divisions of the Sight-belt; (e) The Height of the Letters; (f) The Breadth of the Letters; (g) The Chirographic Rhomboid.

2. (a) *The Sight-circle*. On the retina, in the axis of the eye, there is a little, round, yellow spot, about one-thirtieth of an inch in diameter, where distinct perception

is most perfect. This spot has, externally, in the direct line of sight, its correspondent in a circle, increasing in size with the distance from the eyes, and which at fourteen inches distant is about seven-eighths of an inch in diameter. Only that, in the field of view, which lies within this circle, forms the image on the yellow spot, and to this image, the mind limits and upon it concentrates

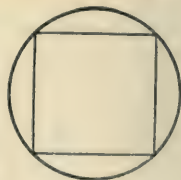


its attention. To take in distinctly, at one act of perception, the whole of the letter, or other object, it must not extend beyond the limits of the sight circle; if it be larger, the sight and the attention must be shifted. The sight circle is, therefore, the unit of vision.

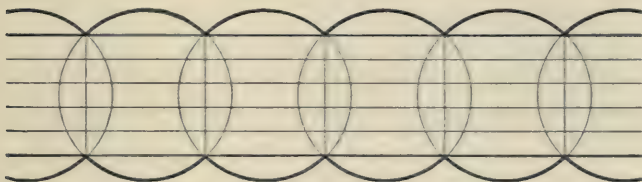
3. Each eye has six muscles to move it, of which one on the top and one on the bottom of the eye move it in a vertical plane, one on the left side and one on the right side of the eye move it in a horizontal plane. These binocular vertical and horizontal planes are the central planes of vision, at whose intersection is the point of sight, that is, the sight-circle's center, upon which the mind fixes its thoughtful attention.



4. (b) *The Fundamental Square.* The external horizontal and perpendicular directions, therefore, correspond with the visual central planes. From these and the sight-circle, the visually fundamental square, which is the greatest that can be inscribed in that circle, derives its size and its cardinal boundaries.



5. (c) *The Sight-belt.* That within the sight-circle having been perceived, the sight, in reading, leaps to the right to a second circle, then to a third, to a fourth and so on. That the sight may perceive all that is passed over, the sight-circles will have to overlap. To form the broadest possible, *continuous* band, of uniform width, with the fewest leaps, they must be the length of the greatest square that can be inscribed in the sight-circle, and which, at fourteen inches distant from the eyes, is about five-eighths of an inch. The continuous band so

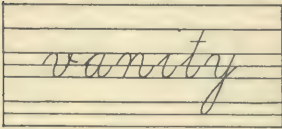


formed of horizontally contiguous, fundamental squares is the sight-belt.

6. (d) *The Division of the Sight-belt.* For every change in distance to the object viewed, the accommodation of each eye and the focussing of the two eyes must be adjusted. As much less adjusting is necessary when the objects successively viewed lie before us in a horizontal line than if receding perpendicularly, therefore, the line of reading, that is, the line across the breadth of the letters, should be horizontal. This makes the divisions of the sight-belt, for the breadth of the letters, along its horizontal length, and for their height, across its vertical breadth.

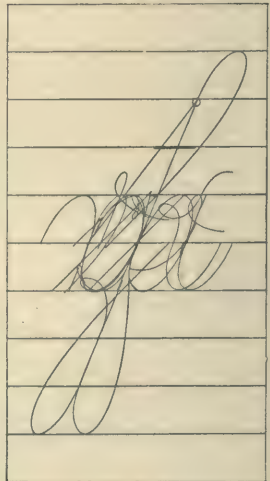
7. The imaginary line which runs horizontally through the center of the sight-belt is the median line, because it passes through the center of the sight-belt, through the

center of the sight-circle, and because it is the medial or normal writing position whence the pen moves up and down always to return. The perpendicular center of the body of the small letter, and its beginning and end, should be on the median line, so that the letter can be easily seen and easily connected.



8. The perpendicular breadth of the sight-belt is divided into five equal, horizontal spaces.

These spaces are an eighth of an inch broad, perpendicularly, which is the basis of height. The central space extends half a breadth above and half a breadth below the median line, and in this central space the bodies of the small letters are written. The lower line of the central space is the base line, that is, the line written upon. The central four horizontal spaces and their divisions correspond to the structure of the small letters, as the accompanying alphabetical monogram shows. The fifth



space is a provision for the necessary enlargement of the capitals. (In the diagram two divisions represent a space.)

9. (e) *The Height of the Letters.* The perpendicular breadth of the central space of the sight-belt, is the height of the short small letters *a, c, e, m, n, o, s, u, v, w, x*. The small *r* and the last part of the small *k* are made one and one-quarter height. The small *d, k, t,* and *i* with the dot, are made two heights; the small *b, g, h, l, q, y, z,* two

and one-half heights; the capitals, except the *J* and *Z*, three heights; the small *p*, three heights; the small *j*, with the dot, three and one-half heights; the small *f*, four heights; the capitals *J* and *Z* five heights, which is the entire breadth of the sight-belt. The height can be varied as necessitated by circumstances.

NOTE. Taking the $\frac{1}{8}$ -inch height of the short, small letters *a*, *n*, etc., as the basis of height, the height of the letters shown in tabulated form is as follows:

<i>Letters</i>	<i>Height</i>
<i>a c e m n o s u v w x</i>	1
<i>r</i> (and last part of the <i>k</i>)	$1\frac{1}{2}$
<i>d k t i</i> (with the dot)	2
<i>b h l—g q y z</i>	$2\frac{1}{2}$
<i>p</i>	3
<i>j</i> (with the dot)	$3\frac{1}{2}$
<i>f</i>	4
The capitals (except <i>J Z</i>)	3
<i>J Z</i>	5

10. (f) *The Breadth of the Letters.* Sight alone considered, the equal dimensions of the sight-circle and of the fundamental square indicate equal dimensions for the basic figures; but as the letters must be read across their breadth, facility for reading requires that they be made of a minimum breadth, so that as many as possible can be crowded into the horizontal breadth of the sight-circle to be taken in at one act of perception. A due consideration of both of these opposite principles demands that the basic figure for the letters be made about half as broad as it is high. This breadth corresponds with the bisection of the fundamental square by the vertical plane of vision, whence we have the visually, fundamental parallelogram. Under the structure of the letters their breadths will more fully appear.



NOTE. For the standard height of $\frac{1}{8}$ inch for the short, small letters *a, n*, etc., the breadth of the 26 small letters, in hundredths of an inch, is, approximately, as follows:

Letters	Breadth	Letters	Breadth	Letters	Breadth
<i>m</i>.....	.26	<i>a d q</i>.....	.16	<i>o r t z</i>.....	.12
<i>w</i>.....	.24	<i>b</i>.....	.15	<i>f</i>.....	.11
<i>n p</i>.....	.20	<i>g x</i>.....	.14	<i>c i j l</i>.....	.10
<i>h k u v y</i>....	.18	<i>s</i>.....	.13	<i>e</i>.....	.7

Average breadth .15 inch per letter.

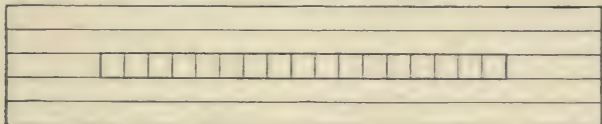
In Mr. R. C. Eldridge's pamphlet (1911), List No. 4 contains an aggregate of 9018 words, being the vocabulary used on two pages of the Buffalo Sunday *Times*, said list consisting of 2087 *different* words. These 2087 different words contain 13,681 letters—an average of 6.55 letters per word. Taking the average breadth of the letters, as above, the average word, in our present spelling, would have a breadth of .983 inch. In the phonetic rendering of the Universal Alphabet the average word would have a breadth of only .847 inch, and would fall within the limits of the $\frac{7}{8}$ -inch sight circle—the unit of vision. Correctly spelled and correctly written, the average word can, therefore, be taken in at one act of perception, whereas in our present spelling it requires two acts of perception; and when the word is written in the present, *absurd* 40–60° slant, the word can barely be so perceived.

As the hexagon crystal in the mineral kingdom, the hexade arrangement of the flower in the vegetable kingdom, the hexagon cell of the bee in the animal kingdom, and the hexagon figure drawn by the human mind, all obtain their hexade forms from the same source in nature; and as the human mind is the acme of terrestrial creation, as its function is *to think*, and as thought is expressed both audibly and visibly—the fact that the average, audible word, the *unit of speech*, when *correctly spelled and correctly written*, should be contained within the breadth of the sight circle—the *unit of vision*—is a striking coincidence.

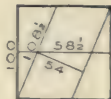
The absurdities in the handwriting so long taught in our schools will appear from the following: *As to Form*. 1st, the 40°–60 slant writing has a mean directionality for its basic parts of 50 degrees from vertical—a character so formed is horizontal, not vertical; 2d, it takes up 60 per cent more space, in breadth, than is necessary; 3d, it compels the writer to write and the reader to read 33 per cent superfluous length of lines; 4th, it does not fit the

sight, it is hard to read, and it is injurious to the eyes; 5th, the form in no way corresponds to movement. *As to Execution:* The muscle movement has no fixedness of direction, it lacks precision and speed, it is too cumbersome, and it is not at all adapted to make straight lines that run uniformly in the same direction;—it is not the movement that nature has specially adapted for handwriting. In other words, neither form nor execution corresponds with either movemental, visual, or geometric principles—the elements that constitute the principles of chirography.

11. (g) *The Chirographic Rhomboid.* As the sight-belt is made up of horizontally contiguous, fundamental squares so the central space can be considered as made up of smaller or chirographic squares as follows:



12. If in this little chirographic square two downslant lines be inscribed, as far apart as they can be, they will, with that portion of the horizontal lines connecting them, form a rhomboid. Taking the vertical height of this rhomboid at 100, its horizontal breadth is $58\frac{1}{2}$, its slant height is $108\frac{1}{2}$ and its breadth at right angles to its slant is 54. This figure is outlined between the letters, when to the small *g*, *j*, or *y* is joined a small *f*, *h*, *j*, or *l*, and may be called the chirographic rhomboid.



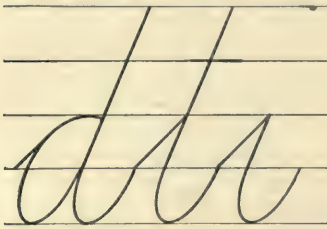
(3) THE BASIC PARTS OF THE LETTERS

1. The basic parts, or elements of which the letters are composed, are: (a) The Dot; (b) The Pear-shaped Tick; (c) Straight Lines; and (d) Curved Lines.

(a) *The Dot*

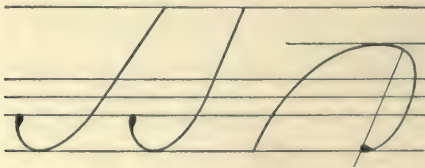
2. The dot occurs only in the small *i* and *j*, which bear so striking a resemblance to the stems in the small *d* and *t*,

as to elicit the wonder whether they may not at one time have been so made and afterwards the connecting line dropped. The suggestion indicates that the dot be placed two heights above the base line, on the slant with the line over which it is placed. It must be made rather light and round.



(b) *The Pear-shaped Tick*

3. This element occurs fifteen times in the capitals, and twice in the small letters, and involves the principle of shading. For the initial of the capitals *A*, *M*, and *N*, the pen is placed in writing position, at the point of beginning the letter, and, before moving the pen, its nibs, by pressure, are spread to about twice the breadth of a shaded line; the pen is then moved downward, that is,



retracted, and the pressure almost instantly withdrawn. For the terminal of the stem, in the capitals *F*, *G*, *H*, *I*, *K*, *S*, *T*, *X*, and *Y*, the pen is moved up to the point of ending the stem, the nibs of the pen are then spread, and the tick made as before, but down over the light upline. In the capital *P* the tick is made to the right, and in the *B* and *c* as in the stem letters (smaller in the *c*).

(c) *Straight Lines*

4. All straight lines are either: Horizontal, Perpendicular, or Slant. The first two correspond with the central planes of vision, and are fundamental in direction—the letters in their height and breadth corresponding hereto. But the pen and the movements are not well adapted to make the horizontal line, and it spreads the letters too much, wherefore it is little used—only as crossings in the small *t*, and in the capitals *F* and *X*. The vertical line also is not well adapted for writing, and has, therefore, given way altogether to slant lines which will be considered under: First, the Uplant Line; Second, the Downslant Line; Third, the Backslant Line.

1st. THE UPSLANT LINE

1. The main or heavier lines are made downward, and to progress to the right, that is, to conform to dextral progression, a succeeding downline must be made to the right of the preceding. To connect the two downlines, progressively, the end of the former must be connected with the beginning of the latter, and that necessitates a connecting line running to the right and upward.



2. The upslant line, therefore, represents dextral progression, it is always made upward and to the right, and it has its origin in being the line which connects the bottom of the left with the top of the right vertical line of the

fundamental square. It is a mean between length and breadth, it lies half way between perpendicular and horizontal, and it slants 45 degrees upward and to the right.



3. When the two connected downlines are long and very

close together, that is, when the space crossed by the connecting line is horizontally narrow, the connective is nearly vertical; when they are short and very far apart, that is, when the space crossed is horizontally long, the connective is nearly horizontal. As the fundamental square, which has equal length and breadth, has its



origin in the eyes, visual and geometrical principles indicate that this line of primary deflection cross equal length and breadth, and that singles out the right diagonal of the fundamental square, which slants upward and to the right, 45 degrees from the vertical.

4. As the upslant line traverses equal length and breadth, and the basic figures for the letters are only half as broad as long, the 45 degree upslant is apparently inconsistent; but its coincidence will be shown. Draw a horizontal square, bisected both vertically and horizontally into equal parallelograms, and cross the upper left and



lower right quarters with upslant lines. These upslant and central vertical lines correspond to the mean directions of the quadrants of the chirographic oval, of which, both the upper and lower half are of full breadth.

5. By inscribing in the diagram the upper and lower halves of the chirographic oval, in the form of the chirographic line of beauty, the coincidence of the length and breadth of the upslant and vertical lines of the diagram, with the quadrants of the chirographic oval, will be seen.



6. The capitals are made so much taller than the small letters, that were their breadths increased correspondingly, the sight, in passing from left to right while reading,

would have to travel so great a distance, that it would hinder rapid reading, besides being disadvantageous to the writer. Therefore, where lengthy upslant lines are used, as in the capitals *A*, *N*, and *M*, the upslant is reduced to about $33\frac{3}{4}$ degrees from the perpendicular, and in the dual form of the capital *W* (see page 93), and in the small *k* and *p*, to about $37\frac{1}{2}$ degrees. This spreads the uplines and downlines in these letters, approximately, to one-fourth and to one-third of their heights respectively.



2d. THE DOWNSLANT LINE

1. The downslant is a necessity from other causes and will be considered under: Firstly, The Movemental Cause; Secondly, Geometric Principles; Thirdly, Dextrality; Fourthly, Verticality.

FIRSTLY. MOVEMENTAL CAUSE

2. The movemental cause for the slant will be considered under: (A) Location of Cause; (B) Plane of Action of Second Finger; (C) Direction of Action, How Changed; (D) Anatomic Necessity.

3. (A) *Location of Cause*. As the arm movement is little used in ordinary writing, and the muscle movement is wholly dependent for its direction upon the will of the writer, the movemental cause for the slant lies in the finger movement. As this movement combines the actions of the fingers and wrist, and as only the former is in the direction with which the slant is connected, the cause for the slant lies in the action of the fingers. As their action is produced by the thumb, the first and second fingers, and as the latter controls the direction of the

action, the cause for the slant lies in the second finger. As this finger's action is dominated by its second joint, therefore, the movemental cause for this slant lies in the action of the second joint of the second finger.

4. (B) *Plane of Action of Second Finger.* When the hand is at right angles to the base line and its back is turned up so that the second finger hangs vertically, the forepart of that finger, as it hinges at the second joint, moves perpendicularly to the base line, because this joint has no lateral action. The action of the second joint is, therefore, in the plane in which the finger lies.

5. (c) *Direction of Action, How Changed.* The direction of this action of the second finger, relative to the base line, can be changed in three ways, viz.: 1st. By tilting the top of the hand to the left or to the right from the vertical position; 2d. By turning the hand at the wrist to the left or to the right; 3d. By turning the arm at the elbow to the left or to the right. The striking similarity in the three ways of changing, and in their effects, indicates a common cause, namely, the change in the position of the second finger relative to the base line.

6. (D) *Anatomic Necessity.* In correct writing position, the arm and the hand are at right angles to the base line, and the top of the hand tilts far enough to the right to hold the penholder in a vertical plane at right angles to that line. This leans the top of the second finger so much



to the right that the action of its second joint, because it has no lateral range, carries the pen upward on a slant

of about $22\frac{1}{2}$ degrees to the right of the perpendicular, varying only slightly with different hands. This slant is, therefore, a movemental or anatomic necessity, and therein the slant in writing has its foundation.

SECONDLY. GEOMETRIC PRINCIPLES

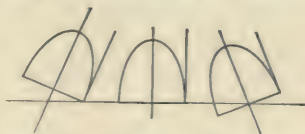
1. This topic will be considered under: (A) The Three Directions; (B) The Chirographic Trio; (C) Effect of Changing the Trio.

2. (A) *The Three Directions.* The small alphabet contains 133 curved lines, 71 of which are quadrants of the chirographic oval, and 51 straight lines, 21 of which are major tangents of such quadrants. The preponderance of the curves and the predominance of the chirographic oval are apparent.

3. The use of ovals implicates three directions or lines, viz.: the mean direction of the left quadrant, the mean direction of the right quadrant, and the direction of the major axis; as, for example, of the upper half of the oval, thus:



4. Writing is named after the direction of the middle line of this trio (i.e., the direction of the major axis or major tangent), as slant, vertical or backhand. Backhand, or backslant, is so little used, and is so inconsistent for the main direction of the writing that it is not necessary to consider it. The slant, as

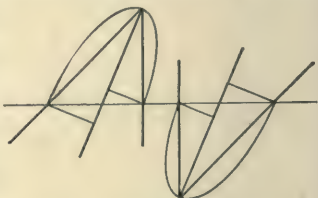


commonly taught, is 40 degrees from the vertical (50 degrees from the horizontal), but this is herein considered to be $37\frac{1}{2}$ degrees from the vertical, as that gives to it a divergence of $22\frac{1}{2}$ degrees from its 60-degree upslant. The slant taught in this treatise is $22\frac{1}{2}$ degrees, and is properly designated as the natural slant, and the writing as natural slant, dextral, or right-sided vertical writing.

5. (B) *The Chirographic Trio.* As the sight-circle, the visually fundamental square and the cardinal lines, have their origin in the eyes, and represent the fundamental principles of circumlining, of superficial extension, and of direction, to produce visually correct curvilinear, spatial and directional representations, the fundamental curves, or ovals, must accord with these fundamental principles. As the mean between the left and lower cardinal lines of the square has been established as the upslant line, this, with the vertical line, gives the two directions, or lines, to which the two quadrants, respectively, must conform in their *mean directions*. But as



these quadrants, for correct circumlining, must be tangentially united, they must have a common direction for their major axes, and this common direction can only be the mean between the 45-degree upslant and the vertical lines. This establishes, geometrically, the $22\frac{1}{2}$ -degree downslant as the middle direction, or middle line of the fundamental trio. The lower trio is inversely like the upper trio.



6. As these three directions, or lines, are fundamental principles in penmanship, they will be designated as the chirographic trio, and the rhomboidal oval constructed in conformity with them, as the chirographic oval.

7. The 45-degree upslant, the $22\frac{1}{2}$ -degree downslant, and the vertical lines of the chirographic trio, as has been shown, have their positions, directions and divergence fixed by the principles of geometry, dextrality and vision

upon which the structure of the letters also is founded, and their correct composition is, therefore, in perfect harmony with and is inseparable from the chirographic trio. The accompanying diagram of the small letter *x* shows how perfectly it accords with the chirographic trio.

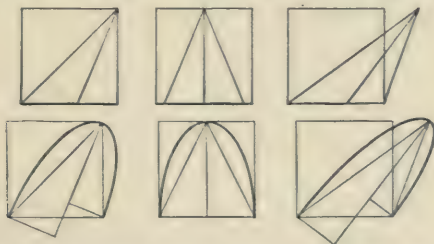


8. (c) *Effects of Changing the Trio.* With the apex stationary, the trio can be veered, at the bottom, to either side. If to the left, its measurement on the median line so increases, that when the middle line slants $37\frac{1}{2}$ degrees, the trio measures nearly $1\frac{1}{2}$ breadth. If veered to the right, its measurement decreases until the middle line becomes vertical, when the trio measures only about four-fifths of a breadth; thence it so increases that, when



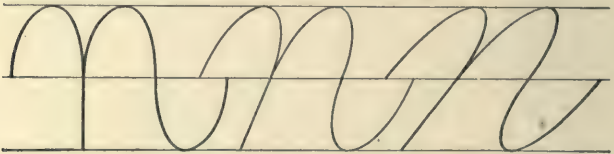
the first line becomes vertical, the trio again measures one breadth. The last is its inverse or sinistral position.

9. To preserve the correct breadth of the letters, when the trio is veered, it is necessary to change its spread along

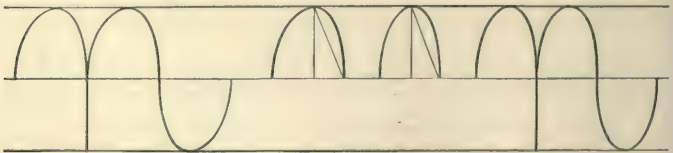


the median line. But this requires to diverge the three lines, in vertical writing, to more than $22\frac{1}{2}$ degrees, and in the slant writing as now taught to less than $22\frac{1}{2}$ degrees.

10. This greater divergence of the three lines, in vertical writing, relatively so broadens the upper right and lower left quadrants of the oval, that the spatial inclosure is thrown away from the tangent instead of towards it as it should be. The less divergence of the three lines, in the $37\frac{1}{2}$ -degree slant writing, narrows the ovals too much. The effect of these changes, on many letters, appears from the following:

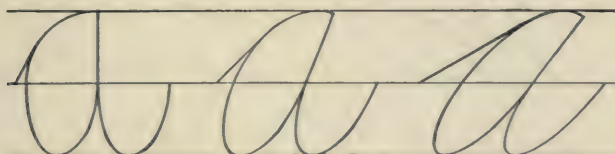


The distortion caused by this change in the $37\frac{1}{2}$ -degree slant cannot be overcome; that in the vertical writing can be partly remedied by narrowing the divergence of the second and third lines so that their spread, on the median line, will agree with the chirographic trio. While this diverges the lines in the vertical trio unequally, the letters become better thereby than if the divergence were not changed, because the change narrows the upper right and lower left quadrants and, therefore, makes their mean direction nearer vertical.



11. The vertical so broadens the upper left quadrant, in the letters of the small *a* group, that the curve becomes a quarter of a circle—an element foreign to the letters; and in the $37\frac{1}{2}$ -degree slant, the quadrant is so lengthened

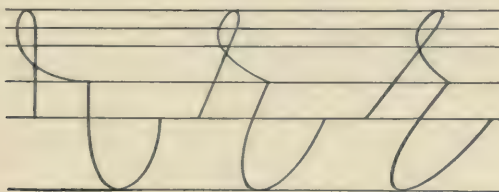
that it becomes too narrow and flat. That these extremes distort those letters, the following illustration shows, viz.:



12. The *r* top has its lower curve too broad and full in the vertical and too narrow and flat in the $37\frac{1}{2}$ -degree slant, thus:



Their effect will appear from the following illustrations:



13. The foregoing shows that either change in the trio encounters incongruities, and, as has been stated, that the correct structure of the letters is inseparable from the chirographic trio, whose middle line slants $22\frac{1}{2}$ -degrees. This is, therefore, geometrically the correct downslant.

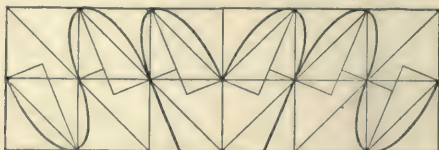
THIRDLY. DEXTRALITY

1. This subject presents itself for consideration under the topics of: (A) Bilaterality, and (B) Dextrality.

2. (A) *Bilaterality*. When looking straight forward, the vertical central plane of vision is perpendicular to the horizontal line and divides the field of view into a left field and a right field which correspond to man's bilaterality.

3. When looking at an object located in the right field of view, the line of sight crosses the horizontal line slantingly, upward and to the right from perpendicular. When looking at an object located in the left field of view, the line of sight crosses the horizontal line slantingly, upward and to the left from perpendicular. Therefore lines slanting upward and to the left belong, visually, to sinistrality, and lines slanting upward and to the right, to dextrality.

4. In squares on each side of the vertical central plane, insert in the right square the upslant and downslant lines, and in the left square, two corresponding lines slanting to the left, as shown. Then construct the small letter *n*, for example, in each of the diagrams, in conformity with the trios, thus:



Now, if the left diagram be lifted up from the left side and laid over on the right diagram, all the lines of the two diagrams will exactly correspond. Likewise

if the right diagram be lifted up from the right side and laid over on the left diagram. The diagrams are, therefore, inversely alike and illustrate bilaterality, the right diagram belonging movementally and visually to dextrality, and the left diagram to sinistrality. The appropriation of slants, like those in the left diagram, to a back-hand right-hand writing is, therefore, a perversion of fundamental principles.

5. (B) *Dextrality*. Man is right-eyed. That he is right-handed and right-armed is well known but the dextrality extends further. He is also right-eyed, or right-sighted. If the thumb be held at arms length centrally between and on a level with the eyes, and a point on the wall, a little above the thumb, be looked at, two thumbs will be seen: one, the retinal image of the right eye, nearly in line with the line of sight; the other, the retinal image of the left eye, some distance to the right. This indicates that the eyes are wont to focus to the right, and accounts for a vertical line appearing to slant a trifle to the left. It may require some practice to make the observation.

6. Man is right-sided. This dextrality requires the writing to be done to the right of the body, and to view the writing correctly, the writer turns his body to the right. This turning brings the line of sight slantingly across the median line. In correct position, the vertical plane of vision, when at the point of beginning the line of writing, is approximately on line with the downslant. In following the writing to the right, the head so turns, that at the end of the line of writing, the line of sight is nearly on line with the upslant.

7. The foregoing shows that the $22\frac{1}{2}$ -degree downslant of the chirographic trio accords with man's dextrality.

8. For the reader, the paper should be held half the

breadth of the sheet farther to the left, so that the line of sight will be parallel with the downslant lines in the middle of the page. As the paper is held stationary, the head or eyes, in reading, turn and constantly change the angle at which the line of sight falls across the median line, but this position of the paper brings the heavier or downslant lines into the average drift of the reader's line of sight.

FOURTHLY. VERTICALITY

1. The points under which this topic will be investigated are as follows: (A) The Standpoints of the Writer and the Reader; (B) Extension of Letter; (C) Origin of Verticality; (D) Necessity for Natural Slant; (E) Vertical Writing; (F) Ordinary Slant Writing.

2. (A) *The Standpoints of the Writer and the Reader.* The claims of vertical and slant writing grow out of the different relations of the writer and the reader to the writing. Surface thought opposes these claims and proclaims, on the one hand, that the object of the writing is that it may be read, and that legibility, therefore, subordinates all other considerations; on the other hand, that, as the writer works ten times as long to produce the writing as the reader to read it, the writer's claims, therefore, are paramount.

3. Were the necessities of the reader and the writer so diametrically opposed, the writer's greater claims would be irrefutable, as the following comparison shows, viz.: The pen is set, in a way, and the writer's fingers and hand must accommodate themselves to it; the desk is unyielding, and the writer must pose accordingly; the paper has lines, real or imaginary, that the writer must follow; the letters have established forms that the writer must make exactly; and the members, although all have favorite and some have unilinear and fixed

courses of action, must through all this entanglement be used correctly by the writer.—*The reader looks and reads.*

4. The reader is an analyst, and sees the whole before the parts; the writer is a synthesist, and sees the parts before the whole. One is at the reading end, the other at the writing end. Therefore, although their claims grow out of the different processes, they are no more antagonistic than are analysis and synthesis, and correct writing fits both.

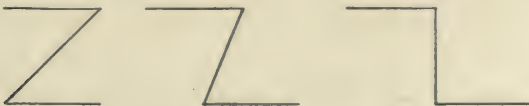
5. (B) *Extension of Letter.* A line is a line and has only length; a letter is a surface and has length and breadth. The reader sees the letter in both its length and breadth, wherefore it must be vertical as a *surface* and not simply in some one, separately considered, line.

6. Connect the horizontal lines of the visually fundamental square with two extreme vertical lines, then with one central vertical, then with the upslant line, thus:



These figures although differing in form, as do the letters are all vertical.

7. Add to this what progression implies, that is, that the end of the former part of the figure be connected with the beginning of the latter part, and connect the horizontals of the fundamental square, accordingly, with an upslant, a downslant, and a vertical line, and it makes figures as below. Of these, the first is vertical, the other two slant backwards.

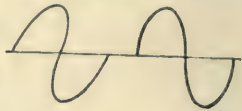
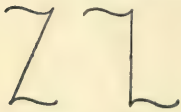


8. To complete the combination, the dimensions must be correctly proportioned; that is, each of the two horizontal lines of the figure must, in length, be made about half its vertical height—that makes the figures thus:



In the first figure, the last line ends to the left of the end of the first line and thereby transgresses against the law of dextral progression; the third figure has too much horizontal spread, and transgresses against the law of spatial economy; the middle figure avoids such mistakes of the other two. The first is connected with the upslant line and slants to the right; the last is connected with a vertical line and slants to the left; the middle figure is connected with the downslant line and is vertical, or nearly so.

9. Whether, at the top and bottom, straight or curved lines be used, the principle is just the same; the curves simply cut off the lineal corners but do not change the direction of the letters *as surfaces*. Illustrations of the zigzag capital Z, and of the chirographic line of beauty suffice to show this. Neither does the fact change the principle

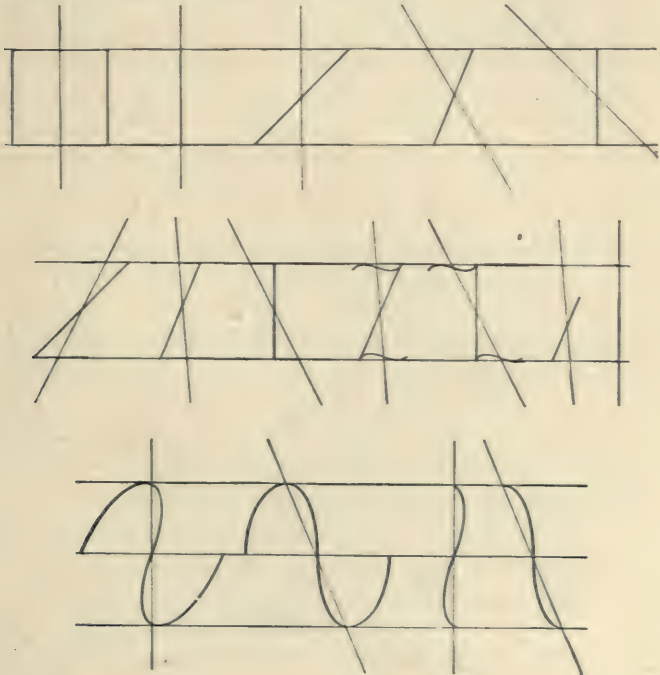


that the forms of some of the letters require that an extended top or bottom be partly or wholly wanting, as is shown by the vertical line of beauty, and by the figure 1 which latter has nothing / | but the slant to help the line indicate breadth.

10. (c) *Origin of Verticality*. The æsthetic principle of verticality in our nature, has its origin in the anatomy and functions of the eyes and in our manner of thinking. A character to have length and breadth must extend into

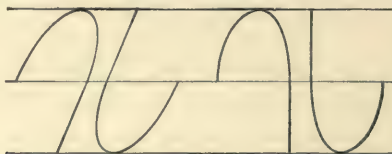
both the vertical and horizontal planes of vision. The mind then perceives the character as a surface and, if intended to be vertical, intuitively draws an imaginary line through the center of up and down extension *as perceived*. If this center line is vertical, that is, if, in front view, it falls only into the vertical plane of vision, it agrees, and is agreeable, or pleasing; if it does not so fall, it does not agree, and it is not agreeable, and not pleasing.

11. That this is correct will be seen, when, in the foregoing illustrations, through the centers of their extended tops and bottoms, and through the vertical centers of the figures, straight lines are drawn, thus:



These centering lines indicate the up and down directions of the figures and show that, to be aesthetically correct, the top must be vertically over the bottom. This, for a half breadth character, requires, a 26-degree downslant line; but as dextral progression and spatial relations have also to be correctly represented by the curves, verticality and the greatest degree of compliance with other rules are best conserved by the use of a $22\frac{1}{2}$ degree downslant line.

12. (D) *Necessity for Natural Slant.* As in the letters the tops, when present, are, for progressional reasons, to the left and the bottoms to the right of the down line, so that verticality of the letter, as a surface, is impossible with a vertical downline, but is fairly well attained with a $22\frac{1}{2}$ degree downslant line, as is shown in the chirographic tangents, the natural slant is a necessity.

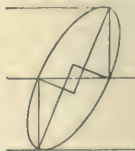


13. *Balancing up the Letter, Vertically.* When the

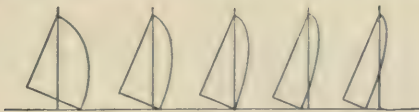


major axis of the ellipse is vertical, the minor tangential points of the upper right and lower left quadrants of the ellipse are *always* the breadth of the quadrants to the left and to the right, respectively, of their major tangential points; that is, the mean

directions of these quadrants slant to the left. But when that axis slants $22\frac{1}{2}$ degrees, the corresponding minor tangential points, in the chirographic oval, are vertically over and vertically under their major tangential points; that is, the mean direction of these quadrants is



exactly vertical. In other ovals which have the major axis on the down slant, by narrowing or broadening the corresponding quadrants their minor tangential points can be thrown to either side of their major tangential points, thus:



That gives to the $22\frac{1}{4}$ -degree downslant a wonderful adaptability for balancing up the letters, vertically, by throwing the spatial inclosure in the upper and lower part of the oval to either side as may be required. This is an advantage not possessed by vertical writing.

14. (E) Vertical Writing. Because vertical writing is named vertical, it must not be inferred that it possesses superior or more elements of verticality than natural slant writing. The former has only one line of its trio vertical, the middle line, and of the other two lines, one slants towards the vertical line dextrally, and the other sinistrally. The latter also has one line of its trio vertical, the third line, and both of the other lines slant towards it dextrally. As dextrality is as essential as verticality, vertical writing, therefore, while it possesses no more elements of verticality than natural slant writing, introduces a sinistral factor that is incompatible with dextrality. This affects the upper right and lower left quadrants of the vertical chirographic oval that occur no less than thirty-five times in the small alphabet in twenty of its letters, and gives to this oft-recurring curve a backslant direction and appearance in the vertical.

15. (F) Ordinary Slant Writing. The slant as commonly taught of 30 degrees *from the horizontal* for the connective or upslant and of 50 degrees *from the horizontal*

for the main or downslant, has a mean of 40 degrees *from the horizontal*. A character so formed is approximately *horizontal*, and, as an intended upright or vertical figure, is off its base, and absurd. A slant of 45 degrees



for the connective or upslant, and of $22\frac{1}{2}$ degrees *from the vertical* for the main or downslant, has a mean of $33\frac{3}{4}$ degrees *from the vertical*.

A character so formed is approximately vertical.

16. Writing is intricate and a violation of one rule carries other violations with it. But when *all* is right, how perfectly it *all* fits together! How precisely this natural slant line, on which the hand and sight dwell, conforms to anatomical, physiological and hygienic laws! How beautifully natural slant writing accords with the principles of vision, geometry and dextrality! How wonderful that the writer's slant makes the reader's vertical letter!

3d. *The Backslant Line*

1. As the upslant line connects the bottom of the left with the top of the right downline of the chirographic rhomboid, so the backslant line has its origin in connecting the other ends of those two lines, and as such it slants backwards, approximately, $9\frac{3}{4}$ degrees.

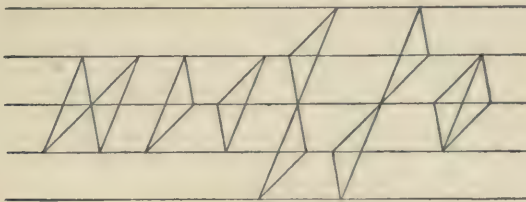


2. The backslant is produced by the simultaneous combination of the action of the fingers and of the action of the hand at the wrist.

3. In a downline, the backslant is used in Roman numerals, printed capitals, mathematical signs, the check mark (\checkmark), etc., in which, however, usage has not settled upon a uniform degree of slant. This lack of uniformity may be accounted for by there being no single action of

the members, in the plane of writing, in a backslant direction.

4. When the downlines of the chirographic rhomboid are connected with uplines, both upslant and backslant, as below, these four lines form two triangles that accord with the actions in the finger movement, with the slants, and with the basic chirographic, triangular figures. These triangles, therefore, are correct movemental exercises and can appropriately be designated as the chirographic triangles. Both should be practiced, as it takes the two to combine the action of the fingers and of the wrist in different ways in which the actions occur in writing. The triangles can be connected variously as shown under the movemental exercises, viz.:



(c) *Curved Lines*

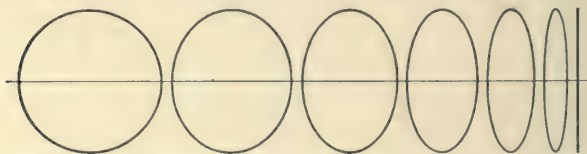
1. This topic will be considered under: 1st. The Ellipse. 2d. The Quadrant. 3d. The Tangential Points. 4th. The Rhomboidal Oval. 5th. The Forms and Sizes of the Ovals.

2. 1st. *The Ellipse*. The star and the raindrop alike assume the shape of a sphere, because that is the most economical solid form; that is, the surface of the sphere encloses more solid contents than the same extent of surface will enclose in any other form. The surface presented by bisecting a sphere, in any plane, is a circle, the

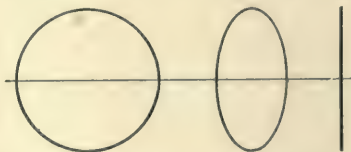
most economical surface form; that is, the circumference of the circle encloses more area than the same length of outline will enclose in any other form. The circle is purely curve and from it all other regular curves are derived.

A straight line is the shortest between two points and is the most economical lineal form. Geometrically considered, any straight line is purely line; visually, only the vertical and horizontal lines are purely lines, as they, severally, alone lie in *one* of the central planes of vision. Surface (superficiality) lies in *both* planes; therefore, every slant line possesses the element of superficiality, because it extends into *both* the central planes of vision.

3. A circle obliquely projected across its breadth becomes narrower to view, until it is turned 90 degrees when it loses all breadth and becomes a straight line.



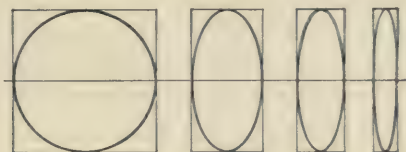
The oblong rounded figure so produced is an ellipse. As the obliquity of projection can be anywhere within 90 degrees, so the breadth of the ellipse can be anywhere between that of a circle, which is full breadth, and that of



a straight line, which has no breadth; but the fundamental ellipse is a mean between the circle and the straight

line and is, therefore, half as broad as it is long. As the circle is the most economical *full* breadth and the straight line the most economical *no* breadth form, the ellipse, which is a mean between the two, is, therefore, the most economical oblong form; that is, the circumference of the ellipse encloses more area than the same length of outline will enclose, of the ellipse's length and breadth, in any other form.

The fundamental or half-breadth ellipse is to the fundamental or half-breadth parallelogram, and every ellipse is to the parallelogram of the ellipse's dimensions, what the circle is to the square. For if a square, with a circle inscribed in it, is projected obliquely, the circle becomes an ellipse and the square, because it has its dimensions

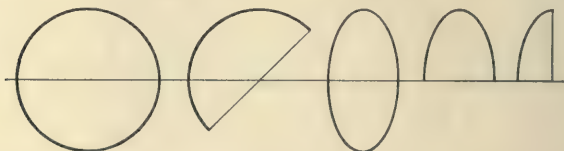


altered by the identical manipulation, becomes a corresponding parallelogram.

4. 2d. *The Quadrant.* A circle is round; an ellipse is oblong. The circle curves equally throughout its circumference, and every part of it is equidistant from its center; the ellipse curves unequally and its circumference varies in distance from its center, but the curvature of the ellipse is as fixed and as determined as that of the circle.

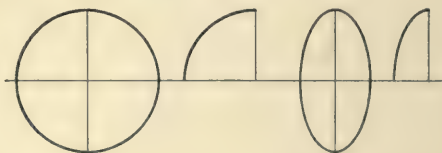
5. If a circle be folded through any diameter and the parts laid upon each other they will exactly overlies; because the circle curves uniformly and alike throughout its circumference. If an ellipse be folded through its major

or through its minor axis and the parts laid upon each other, they will also exactly overlies; but only if there folded, because the ellipse is composed of four equal



quadrants whose varying curvatures are oppositely alike, but only along its axes.

6. If a circle, quartered by a horizontal and by a vertical diameter, be compared with a vertical ellipse, quartered through its axes, it will be seen that a quadrant of the circle has equal length and breadth, but that in a quadrant of the ellipse the length and breadth vary in proportion to the length and breadth of the ellipse.

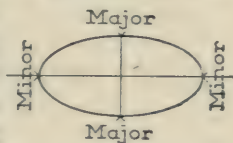


Therefore, the circumference of the quadrant of the circle can quarter-circumline only a surface whose length and breadth are equal; whereas, as the ellipse can have a breadth anywhere between that of a line and that of a circle, the circumference of the quadrant of the ellipse can quarter-circumline any area whose length and breadth differ.

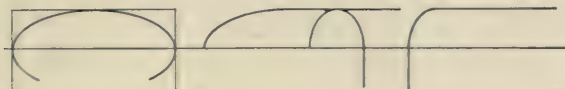
7. As the letters and their basic figures are surfaces whose lengths differ from their breadths, therefore, all the curves in the letters are quarter-circumferences of ellipses,

used to quarter-circumline areas. And as the ellipse is the most economical oblong form, Roman Script, in its evolution, has appropriated *nature's shortest enclosing line*.

8. 3d. *The Tangential Points.* The four points where the axes cross the circumference of the ellipse, that is, the places where the quadrants join, are the tangential points. Those at the broad sides, or opposite to and parallel with the major axes, will be designated as the major tangential points, and those at the small ends, or opposite to and parallel with the minor axis, as the minor tangential points.

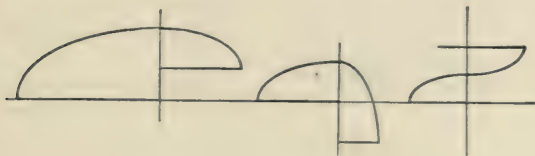


9. The circumference of the ellipse, as it approaches a tangential point from both sides, curves inversely alike, and the curves coalesce at the tangential point, so that, theoretically, the circumference at each tangential point is straight and parallel with its opposite diameter. Therefore, if either end of the quadrant be joined to or continued on in a straight line, parallel with its correspond-



ing axis, the curve and the straight line will make a mellifluous union.

10. Likewise can the quadrants of larger and smaller, or of the same ellipse, be so joined, at like or at differ-



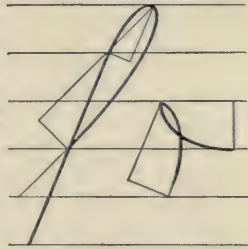
ent tangential points, whether curving in the same or in the opposite direction, provided the axes opposite the points joined are parallel.

11. From the minor towards the major tangential point, the quadrant gets straighter and straighter until it reaches the major tangential point where the curve terminates, *theoretically*, in a perfectly straight line. From the major towards the minor tangential point, the quadrant curves more and more until it reaches the minor tangential point where the curve terminates, *theoretically*, in the perfect curve of the circle. The ellipse is, consequently, a happy blending of the circle and straight line, and of the two tangential points, the major, therefore, is by nature, better adapted to unite tangentially with a straight line, and the minor, with a smaller curve. As the circle curves uniformly and alike throughout its circumference, a straight line run confluent through its circumference anywhere is tangent; but as in the quadrant of the ellipse the increase in curvature culminates at the minor tangential point and the decrease in curvature culminates at the major tangential point, those points are by nature specially adapted for tangential unions and the union of a straight line, or of another curve, with the curve of the ellipse at any other point is not truly tangential.

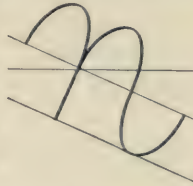
12. The nature of the tangential union should be well understood, for, in the letters, all close unions of straight lines with curves, and of curves with each other, are tangential, except in the large loops, in the dual form of the capital *W*, and in the horizontal oval connections.* In the loops, the major axes of the quadrants, to unite tangentially with the diverging upslant and downslant

* There are several other exceptions; the capitals *D* and *L*, for example.

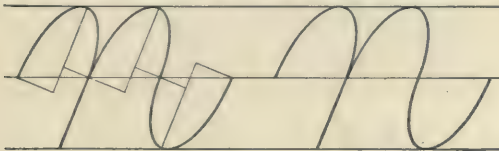
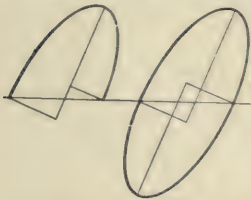
lines, are pushed over each other, so that they overlap $22\frac{1}{2}$ degrees, whereby the union of the quadrants at their minor tangential points is forced, but only to a visually allowable extent. The horizontal oval connections (and the dual form of the capital *W*, see page 93) vary in a kindred manner.



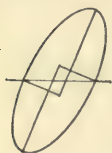
13. 4th. The Rhomboidal Oval. When the major axis of the ellipse lies on line with the downslant, this deflects the minor axis from and throws the lateral tangential points off the horizontal. Letters formed with such an ellipse, therefore, have the line across their breadth run dextrally down hill, as can be seen in the small *n*.



14. To bring both lateral tangential points on a horizontal line, when the major axis lies on the downslant, requires the construction of a rhomboidal oval, whose upper left and lower right, are quadrants of a larger, and whose upper right and lower left, are quadrants of a smaller ellipse. As the lateral tangential points in such a rhomboidal oval are on a horizontal line, letters formed with such an oval have the line across their breadth horizontal, thus:



15. When, in a rhomboidal oval whose major axis is on line with the downslant, the upper left and lower right quadrants are broadened they get longer; and when the upper right and lower left quadrants are broadened they get shorter. Each change in such an oval, therefore, works fourfold. This peculiarity of the rhomboidal oval, as has been stated, is admirably adapted for balancing up the letter, vertically, by throwing the bulk of the spatial enclosure more to one side or to the other, as the peculiarity of the letter may require. (See page 66.) In a vertical oval, the lengths of the quadrants do not change, and balancing up the letter therewith is, therefore, not under such control.



16. The rhomboidal oval is the basic, derivative curvilinear, composite figure for the letters.

5th. *The Forms and Sizes of the Ovals*

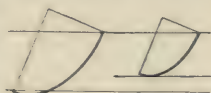
1. Before going into the details of the ovals, a few general observations will be made thereon, and then the ovals will be considered under: Firstly, The Chirographic Oval; Secondly, the Small *o* Oval; Thirdly, the Small *a* Oval; Fourthly, the Loop Oval; Fifthly, the Small Vertical Loop; Sixthly, the Small Horizontal Loop; Seventhly, the Broad Oval; Eighthly, the Small *r* Oval; Ninthly, the Horizontal Oval; Tenthly, the Capital *W* Oval; Eleventhly, Tabulations of the Curves.

2. *General Observations.* (A) As the quadrants of the ellipse circumline two unequal dimensions and must be tangentially united, it is important in studying ovals: 1. To determine the length and breadth to be circumlined; 2. To fix the axes of the ellipse; and 3. To locate the tangential points of the quadrant.

3. (B) The deflection of the major axis from verticality to the downslant, causes the upper left quadrant to extend above a horizontal line passing through the minor tangential point. To keep the perpendicular height of the quadrant within a certain limit, its minor tangential point must, therefore, lie a little below that limit. As, in letters



of ordinary size, this difference in location of the minor tangential point is very small no notice is taken of the difference in describing the parts herein and under the structure of the letters; but due allowance must be made when the size of the letters makes it necessary. This also applies, inversely, to the lower right quadrant.



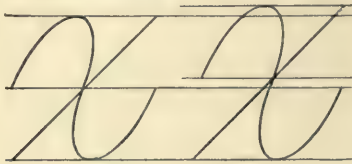
4. (c) The proportion of breadth to length makes the *kind* of quadrant, ellipse, or oval, and when this proportion is maintained, no matter how the quadrant, ellipse or oval, is turned, or what is its size, it is the same in kind. The quadrant, ellipse or oval, as to its position, is named after the direction of its major axis, as, horizontal, vertical, slant, upslant, capital *M* upslant, etc.

5. (D) The ovals, as described herein, are constructed to fit the natural slant. But where, for any reason, different slants or the vertical direction are used, the ovals can be modified, after the principles laid down in this treatise, to suit such directions.

6. (E) Where spatial or other causes necessitate the letters to be made proportionately narrower, or broader, the ovals can be modified to suit the required dimensions. As the ellipse corresponds to the circle in oblique projection, obliquity of projection shortens the axis which is obliquely projected. Therefore, the proportions for a narrower letter can be obtained from a regular

letter held in oblique projection across its breadth, and for a shorter letter, in oblique projection across its height. The principles which apply to the dimensional basis herein must be applicable to such derivative proportions.

7. (F) Some letters can be proportionately narrowed or broadened, respectively (but will not in all cases be so symmetrical), by simply inserting or lengthening, and by taking out or shortening their straight lines, thus:



FIRSTLY. THE CHIROGRAPHIC OVAL

1. The upper left and lower right quadrants of this form of rhomboidal oval are always* made upward, their mean direction corresponds to the connecting or upslant line, and they can, therefore, properly be designated as the connective (or No. 1) quadrants. The quadrant is as follows:

An upslant line drawn from the median line to the upper line of the central space of the sight-belt, downslant lines and lines at right angles thereto, connecting them, drawn from both ends of the upslant line, as below, locate the axes of the ellipse, the tangential points of the upper left quadrant of the chirographic oval, and establish its length and breadth, thus:

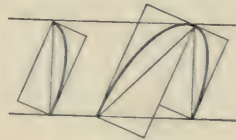


2. The upper right and lower left quadrants of this oval

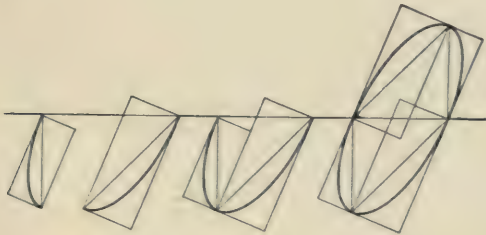
* Except in the Capital K.

are of nearly the same proportions as the foregoing, but as they are always made downward, and as their mean direction corresponds to the downslant line, they can, therefore, properly be designated as the main (or No. 2) quadrants. The quadrant is as follows:

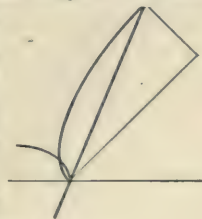
A vertical line drawn from the intersection of the upslant line and the upper line of the central space of the sight-belt to the median line, downslant lines and lines at right angles thereto, connecting them, drawn from both ends of the vertical line, as below, locate the axes of the ellipse, the tangential points of the upper right quadrant, and establish its length and breadth, thus:



3. The lower half of this oval is inversely like the upper half, viz.:



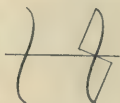
4. The connective quadrant, with its major axis on line with the downslant has its tangential points on line with the upslant. An exception is found in the capitals *I* and *J*, which are made with large, lower left, connective quadrants, having their major axes on line with the upslant, which brings the tangential points of these quadrants on line with the downslant, thus:



5. When the upper and lower main quadrants are joined at their major tangential points, they form the vertical or dextral vertical line of beauty, thus:

This line is beautiful and perfect because it fully conforms to the principles of vision, bilaterality and geometry. Its center corre-

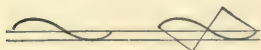
sponds with the intersection of the central planes of vision, the point of sight, and from this central point all corresponding dimensions, curves, spatial divisions and relations are oppositely alike, and the whole, therefore, forms a figure of most perfect, bilateral symmetry.



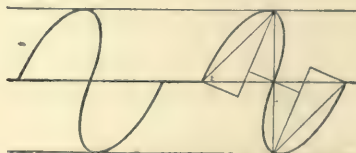
6. When the lower and upper connective quadrants are so joined, they form the upslant or dextral line of beauty, thus:



7. When these quadrants are joined horizontally, they form the horizontal line of beauty that occurs in the capital letters *Q* and zigzag *Z*; in the figure 7; and, in modified forms, in the tops of the capitals *F* and *T*, and in the bottoms of the capitals *L* and *D*.

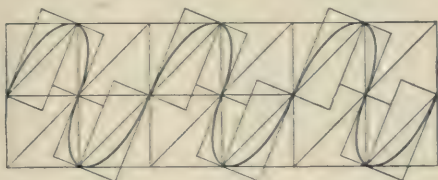


8. If to the end of the upper half of the chirographic oval the lower half is joined, as below, it forms the *chirographic* line of beauty, occurring in the small *h, m, n, p, v, w, x, y*, and in the capital *Y*, as follows:



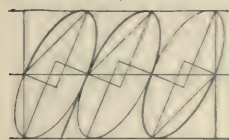
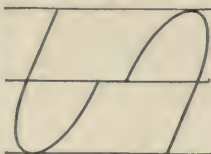
When this line of beauty is continuously connected and crossed with upslant lines, downslant lines, the cardinal

lines of the square, etc., as below, the diagram will show how gracefully this progressive, chirographic line of beauty

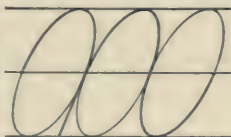


entwines, and accords, with this entanglement of seemingly conflicting dimensions, lines and directions.

9. When the lower half of the chirographic oval begins with a half height downslant line, and the upper half ends with a half height downslant line, they form the upper and lower chirographic tangents, respectively, thus:



10. The following diagram of the small *n* shows how the chirographic oval helps to form parts of a letter. But as the lateral tangential points fall on the horizontal line, it will be simpler for the student to consider the ovals as divided, by the horizontal line, into upper and lower halves, thus:



11. Seven small letters obtain all their curves from the chirographic oval, viz.: The small *m, n, p, t, u, x,* and *i*. It enters into the composition of thirteen other small letters; viz.: *a, b, d, g, h, k, l, q, r, v, w, y,* and *z*. This oval enters also into the composition of the capitals: *M, U, V, W, X, Y* and *Z*. The first mentioned seven small letters may be called the chirographic oval group.

SECONDLY. THE SMALL *o* OVAL

1. In the chirographic oval the upper right and lower left quadrants are narrowed to adapt the curve better to unite with the downslant line. This throws the bulk of the upper half of that oval to the right and of the lower half to the left. Letters like the small *e*, *c*, and *o*, require the bulk thrown more towards the center, and it is also necessary to have a narrower upper left and a narrower lower right quadrant to unite tangentially with the downslant line in the loops, etc., which necessitate a rhomboidal oval with quadrants of equal breadth, made as follows:

2. A downslant line drawn from a little above the upper line of the central space of the sight-belt to the median line, another downslant line through the central space, one-half breadth to the right of the former, lines at right angles to the downslant drawn from the lower end of the left and from the upper end of the right downslant lines, and connecting them, as shown, locate the axes of the ellipse, the tangential points of the upper left quadrant of the oval, and establish its length and breadth, thus:



This quadrant can be designated as the No. 3 quadrant.

3. The same downslant line through the central space of the sight-belt, another downslant line from a little below the upper line of the central space, to the median line, one-half breadth to the right of the former, lines at

right angles to the downslant drawn from the lower end of the right and from the upper end of the left downslant line, and connecting them, as shown, locate the axes of the ellipse, the tangential points of the upper right quadrant of the oval, and establish its length and breadth.



This quadrant can be designated as the No. 4 quadrant.

NOTE. As the ellipse, of which this is a quadrant, is very near half-breadth, therefore, so as not to multiply the basic elements, wherever the parts of a half-breadth ellipse are prescribed, the corresponding parts of this ellipse will be used.

4. The lower half of this oval is inversely like the upper half, viz.:

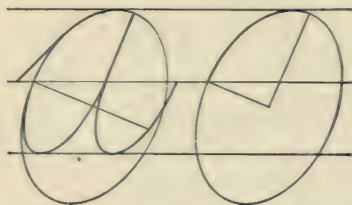


5. This oval will be designated as, simply, the oval.

6. The oval in its entirety enters only into the small *o*, and its parts, into the small *c*, *e* and *z*, into all the large loops, and into many of the capitals.

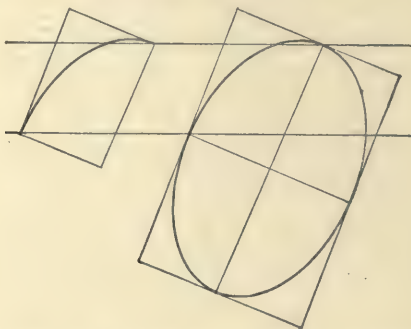
THIRDLY. THE SMALL *a* OVAL

1. In the small *a*, an upper left quadrant of an ellipse is required to circumline a half height and a whole breadth, thus:



A downslant line drawn from some distance above the upper line of the central space of the sight-belt to the median line, a like line from the upper line through the median line, one breadth to the right of the former, lines at right angles to the downslant drawn from the lower

end of the left and from the upper end of the right downslant lines, and connecting them, as below, locate the axes of the ellipse, the tangential points of this quadrant, and establish its length and breadth, thus:



2. The quadrant described will be designated as the small *a*, or No. 5, quadrant. The small *a* oval is an ellipse.

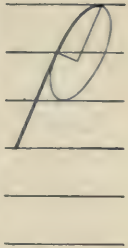
3. This quadrant enters into the small *a*, *d*, *g*, *q*, *f*, *k*, and *s*, and into a number of the capitals. It may be convenient to designate the first four of these small letters as the small *a* group.

FOURTHLY. THE LOOP OVAL

1. If a downslant line of a certain length and from its lower end an equal length upslant line be drawn, and to the two at their spread ends, there be tangentially joined the upper two quadrants, respectively, of a narrow ellipse just broad enough to make the quadrants meet at their minor tangential points, as shown, this makes a perfect loop, so far as the symmetry of the spatial inclosure is concerned, and illustrates the principle of the loop.



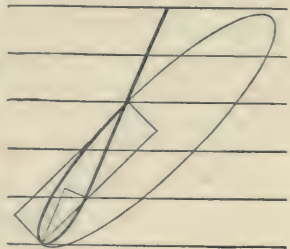
2. But as the loop has no upper sinistral extension to balance it, vertically, the spatial inclosure must be thrown towards the left as much as it will stand. To accomplish this, the downslant line is made two-thirds of the vertical height of the loop, that is, one height above the upper line of the middle space, and to the upper end of the line a half height, upper left quadrant of the oval is tangentially joined, as above.



3. The loop quadrant is then made as follows: draw upslant lines from the point where the downline crosses the upper line of the central space, and from the minor tangential point of the superjoined quadrant down to near the median line; then draw from each of said two points a line at right angles to the upslant, and connecting the two upslant lines, as shown. This locates

the axes of the ellipse (which is always on line with the upslant unless otherwise stated), the tangential points of the upper right loop quadrant, and establishes its length and breadth.

4. The loops below are made inversely like those above the median line.



5. The upper loops which vary from the above usually have the lower part of one or both of the down lines taken

off and a part oval attached, as in the capitals *E*, *L*, *S*,

etc. Such modifications will be appear under the structure of the letters.

This quadrant will be designated as the loop, or No. 6, quadrant.

6. The loop oval is an ellipse.

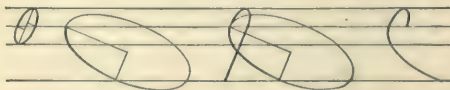
7. In the small letters, the loop quadrant enters into the composition of all the large loops; viz.: *b, g, h, j, l, y, z, f, q* and *e*. In the lower loop of the *f*, and in the loop of the *q*, the major axis of the ellipse is vertical. In the *e*, the loop quadrant is only two-thirds of the regular size. The foregoing letters may be called the loop group. This quadrant also enters into a number of the capitals.

FIFTHLY. THE SMALL VERTICAL LOOP

1. The small vertical loop consists of the upper half of a downslant, rhomboidal oval, exactly like small *o* oval but only one-fourth its size in the small *o* letters, and twice that size in the capitals. The loop is so small that it is closed, in letters of ordinary size. —

The part always consists of the upper half of such diminutive oval and will be designated as the small vertical loop, or as *S V L*.

2. In the small letters, the small vertical loop occurs in the *b, v, w*, and *r*, in all of which it is joined to a light downslant line made upward, and to a larger quadrant, whose minor axis in the first three is horizontal, and in the small *r* is on line with the downslant thus:



In the capitals, the small vertical loop occurs only in the *V* and *W*.

SIXTHLY. THE SMALL HORIZONTAL LOOP

1. The small horizontal loop is half of a diminutive ellipse whose minor axis is always on line with the downslant. In the small letters, it occurs only in the *k* and *z* in both of which it is the left half of the ellipse, tangentially joined to the lower right and to the upper right quadrants of ellipses. In the capitals the left half occurs in the *B*, *K*, *R*, and *Z*; the right half occurs in the *E*; and in the *D* and *L* the lower half of the left half, only, is used.



2. The horizontal length of this loop (or half ellipse), is one-half breadth (and its vertical breadth, or height, is equal to its length) in the capitals, and in the small letters the loop is half that size. As the loop is small it is closed in letters of ordinary size.

This loop (or half-ellipse) will be designated as the small horizontal loop, or as *S H L*.

SEVENTHLY. THE BROAD OVAL

1. The composition of the capitals requires a rhomboidal oval, whose horizontal breadth is about two-thirds of its vertical height, constructed as follows:

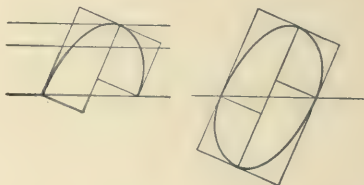
First. Through two horizontal lines, one and one-half spaces apart, draw three downslant lines, two breadths apart, letting the middle one extend a little above and the third a little below the horizontal lines. Then draw lines at right angles to the downslant from the intersection of the upper horizontal and first downslant to the middle downslant line, and from the intersection of the lower horizontal and middle downslant to the first downslant line, thus:



Second. Draw lines, at right angles to the downslant, from the intersection of the lower horizontal

and middle downslant to the third downslant line, and from the intersection of the upper horizontal and third downslant to the middle downslant line, as shown: this locates the lower half axes of the ellipses, the tangential points of the lower left and lower right quadrants of the broad oval, respectively, and establishes their length and breadth, thus:

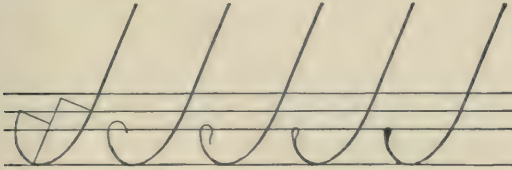
2. The upper half of the broad oval is inversely like the lower half, viz.:



The upper left and lower right quadrants of the broad oval will be designated as the No. 7, and the upper right and lower left quadrants as the No. 8, quadrant.

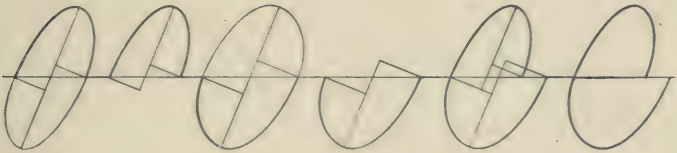
3. The broad oval is about as common a factor in the capitals as the chirographic oval is in the small letters. It is used in the stems of the capitals *F*, *G*, *H*, *I*, *K*, *S*, *T*, *X*, and *Y*, in which to the lower part of the downslant line, is joined a lower right, three-quarter height quadrant, and the lower two-thirds of a lower left, three-quarter height quadrant of the broad oval. About the same portion of the same sized broad oval, but on line with the capital *M* upslant, helps to form the initial curves of the capitals *A*, *M*, and *N*: In all these letters, the upper third of the lower left, three-quarter height quadrant of the broad oval, may be considered as turned

down, or recurved, upon the lower two-thirds so as to form the pear-shaped tick, thus:

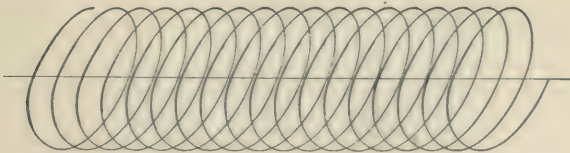


It will be simpler for the student to consider the broad oval as divided, by the horizontal line, into upper and lower half.

4. Another frequent use of this element is in the progressive oval. This composite figure consists of the upper half of the oval and the lower half of the broad oval, thus:

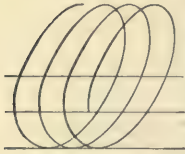


When a number of progressive ovals are connected they are simply repetitions, all above the horizontal center being parts of the oval and all below being part of the broad oval, thus: *



*The flatness in the upper left quadrant disappears when shaded and shows the effect and purpose of shading.

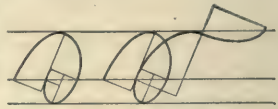
The series should begin and end as does the capital *O*, with the upper left quadrant of the oval and the upper half of the lower left quadrant of the broad oval, respectively. In this or a similar form, the progressive oval, or parts of it, occur in the *E*, *O*, and *Q*, and in the plural forms of the capitals *C* and *D*.



5. The progressive oval is also used in an inverted form; that is, the part of the broad oval is used above and the part of the oval, or of a smaller broad oval, below the center. Such an in-



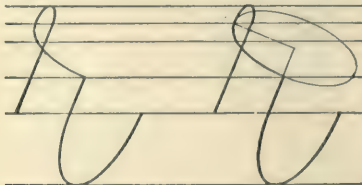
verted progressive oval attachment is used in the plural forms of the capitals *M*, *N*, *U*, *V*, *W*, *X*, and *Z*. It is also used in a modified form in the plural forms of the capitals *F* and *T*, where the top is made thus:



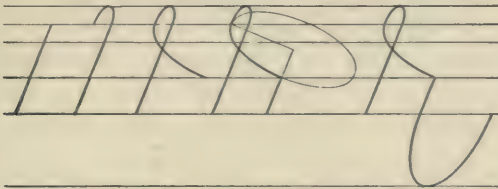
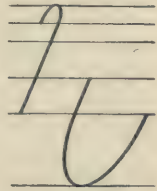
6. The oval spirals or involute endings of the capital *E*, and of the embellished forms of the capitals *C* and *D*, are parts of a progressive oval approached by several larger but decreasing quadrants, leading into the spiral. (See the capital *E*, page 223).

EIGHTHLY. THE SMALL *r* OVAL

1. The quadrant of the small *r* oval occurs in the small *r* and in larger size in the capitals *V* and *W*. It will be best understood by an explanation of the small letter *r*.



This letter begins on the median line with a downslant line, made upward, extending to five-eighths of one height above the median line. To its upper end is tangentially joined the small vertical loop, made upward and to the left. The last part of the letter begins at three-fourths height, or as below, and consists of a quarter height downslant line, and the lower half of the chirographic oval. Beginning the last line at three-fourths height indicates that it should be three-fourths of one breadth to the right of the initial line, thus: To complete the letter there must be tangentially joined to the left end of the small vertical loop a quadrant to connect it with the last line. This necessitates a three-eighth height, one-breadth quadrant, whose minor axis is on line with the downslant, thus:

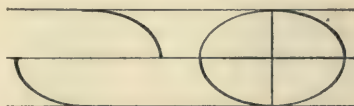


2. The small *r* quadrant is part of an ellipse, whose minor axis is always on line with the downslant, and will be designated as the small *r*, or No. 9, quadrant.

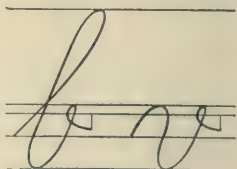
NINTHLY. THE HORIZONTAL OVAL

1. In the capitals *A*, *H*, *I*, and *J* horizontal quadrants are introduced, that measure vertically one-half height, and horizontally one and one-half breadth. The oval to

which they belong, is, therefore two-thirds as broad as it is long, thus:



2. The lower left quadrant of this oval enters into the composition of the first two, and the upper right quadrant into the last two of those letters. This oval also enters into the ending of the small *b*, *o*, *v*, and *w*, thus:

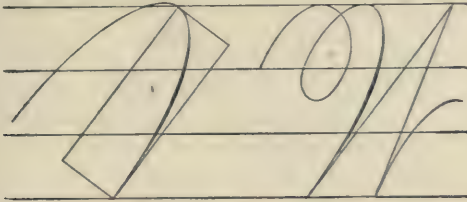


3. The horizontal oval is an ellipse whose minor axis is always vertical unless otherwise stated. The quadrant will be designated as the horizontal oval quadrant, or as the No. 0 quadrant—No. 10 not being available as the *one* (1) has been appropriated numerically, to designate the connective quadrant.

TENTHLY. THE CAPITAL *W* OVAL.

1. In the plural form of the capital *W*, the upper left quadrant of a broad oval is joined to the upper right quadrant of an ellipse whose major axis is on a $37\frac{1}{2}$ -degree upslant. The ellipse is as follows: Between two horizontal lines, three heights apart, draw a $37\frac{1}{2}$ -degree upslant line. At right angles to this line, and from the point where it touches the lower horizontal line, draw to the left a line equal in length to two breadths. From the end of the last line to the upper horizontal line, draw a $37\frac{1}{2}$ -degree upslant line. At right angles to this and from the point where it touches the upper horizontal

line, draw a line to the right upline, all as below. This locates the axes of the ellipse, the tangential points of the



capital *W* quadrant, and establishes its length and breadth.

NOTE. As it is an arduous task for school children to learn four alphabets, print and script, capital and small, the author discourages the use of plural forms, and he has chosen the style of capital *W*, used by good penmen, which corresponds to the small *w*. Owing to the foregoing style of *W* and the multiforms of the capitals *M* and *N*, the author has often read writing where he had to determine from the context whether the letter was intended for a *W*, an *M*, or an *N*. It should be remembered that the writing is for the purpose of being read. All plural forms, shapes, and styles of letters should, therefore, be abandoned in the interest of simplicity and legibility. Flourishes and embellishments will not improve poor writing. Quality shows itself in the smoothness of stroke and in the simplicity and perfection of form.

ELEVENTHLY. TABULATIONS OF THE CURVES IN THE LETTERS

1. In order to present the curves in the letters in tabulated form, the connective quadrant of the chirographic oval will be represented by the figure 1, the main quadrant by the figure 2; and, when more than one quadrant of this oval enters into the curve, the two figures, 12, read as twelve, or 21, read as twenty-one, will be used to represent the upper and lower halves of the oval, respectively.

2. The upper left and lower right quadrants of the

oval will be represented by the figure 3, the upper right and the lower left quadrants by the figure 4; and, when more than one quadrant of this oval enters into the curve, it will be represented by the two figures, 34, read as thirty-four, or 43, read as forty-three.

3. A quadrant of the small *a* oval will be represented by the figure 5.

4. A quadrant of the loop oval will be represented by the figure 6.

5. The upper left and the lower right quadrants of the broad oval will be represented by the figure 7, the upper right and the lower left quadrants by the figure 8; and when more than one quadrant of this oval enters into the curve, it will be represented by the two figures, 78, read as seventy-eight, or 87, read as eighty-seven.

6. The small *r* quadrant will be represented by the figure 9; and a quadrant of the horizontal oval by a cipher (0).

7. The small vertical loop will be designated by the initials S V L, and the small horizontal loop by the initials S H L.

8. The height of the short small letter (as of the *a*, *m*, or *n*), that is the breadth of a horizontal division of the sight-belt, is taken as the unit of height. Therefore, a quadrant that takes up half of one height, vertically, will have *after* it the coefficient $\frac{1}{2}$, thus: $1-\frac{1}{2}$, signifying the connective quadrant large enough to extend from, say, the median to the upper or lower lines of the central space. Likewise with $5-\frac{1}{2}$, a half height small *a* quadrant; and with $6-1\frac{1}{2}$, the latter signifying the loop quadrant extending through one and one-half spaces in height. In some cases, where the quadrant is deflected from its usual direction, its height in the primary position may be given, or its breadth may be given, as one-breadth, half-breadth,

etc. In the tabulation for the capitals, page 99, irregularities in the parts are indicated by Italics.

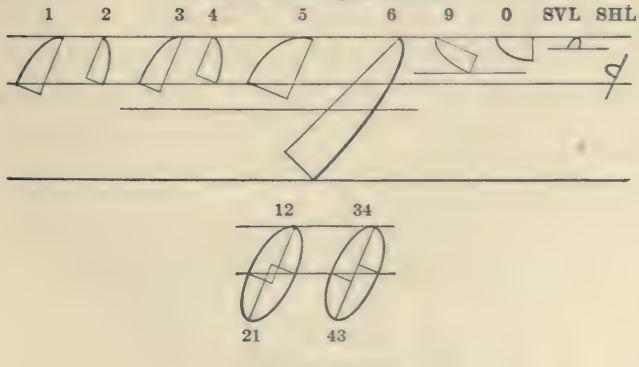
9. The oval or quadrant will be understood to be in its primary axial position unless otherwise indicated.

(A) TABLE SHOWING ALL THE CURVES IN THE SMALL ALPHABET

Quadrants *	Coefficients--Size in Heights		
1.....			
2.....	$\frac{3}{8}$		
3.....	$\frac{1}{2}$	$\frac{1}{3}$	
4.....	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{1}{4}$
5.....	$\frac{1}{2}$	$\frac{1}{4}$	
6.....	$1\frac{1}{2}$	$1\frac{3}{4}\dagger$	1
9.....	$\frac{3}{8}$		
0.....	$\frac{1}{4}$		
S V L.....	$\frac{1}{8}$		
S H L.....	$\frac{1}{8}$		
12.....	$\frac{1}{2}$		
21.....	$\frac{1}{2}$		
34.....	$\frac{1}{2}$		
43.....	$\frac{1}{2}$		

* The small s is an exceptional letter and introduces the $87\frac{1}{2}$ from the capitals, not shown above. † Vertical.

FORMS OF THE QUADRANTS

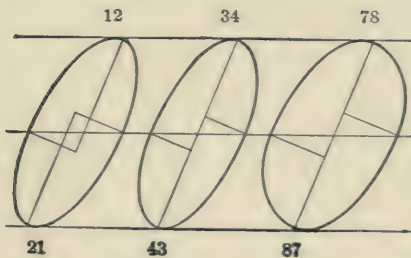
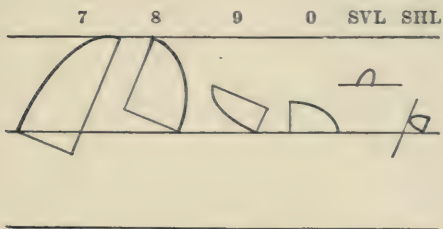
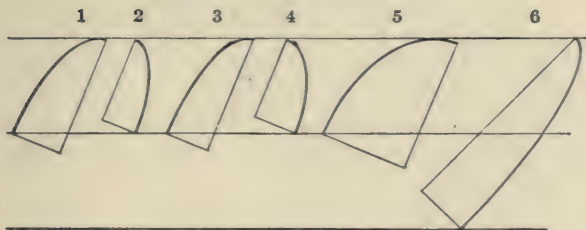


(B) TABLE SHOWING ALL THE CURVES IN THE LARGE ALPHABET

Quadrants *	Coefficients—Size in Heights					
1.....	$2\frac{1}{2}$	2	$\frac{3}{4}$			
2.....	$2\frac{3}{4}$	2	$\frac{3}{4}$			
3.....	$1\frac{1}{2}$	1	$\frac{5}{8}$		$\frac{3}{4}$	$\frac{1}{2}$
4.....	2	$1\frac{1}{2}$	$1\frac{1}{4}$	1	$\frac{3}{4}$	$\frac{1}{2}$
5.....	$1\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$			
6.....	$2\frac{1}{2}$	2	$1\frac{1}{2}$		$\frac{7}{8}$	
7.....	1	$\frac{3}{4}$				
8.....	$1\frac{1}{2}$	$\frac{3}{4}$				
9.....	$\frac{3}{4}$					
0.....	$1\frac{3}{4}$	$\frac{1}{2}$				
S V L.....	$\frac{1}{4}$					
S H L.....	$\frac{1}{4}$					
12.....	$1\frac{1}{2}$	1				
21.....	1					
34.....	$1\frac{1}{2}$					
43.....	$1\frac{1}{2}$	1	$\frac{3}{4}$			
78.....						
87.....	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$		$\frac{3}{8}$	
44.....	3	$1\frac{1}{2}$	$\frac{3}{4}$			
00.....	$1\frac{3}{4}$					

* For irregularities the structure of the letters in Part III must be referred to.

FORMS OF THE QUADRANTS



(C) TABLE SHOWING THE FORM AND SIZE OF EACH CURVE IN EACH OF THE SMALL LETTERS

The Parts in the 26 Small Letters

Letter	The Curves—Sizes in Heights.						NO. OF PARTS IN EACH LETTER				No. of Quadrants
							Total Parts	Curves	Straight Lines	Dots	
a.....	5-½	21-½	21-½	...	...	...	5	3	2	...	5
b.....	6-1½	3-½	21-½	S V L	0-¼	...	8	5	3	...	7
c.....	4-¼	3-½	43-½	...	...	...	4	3	1	...	4
d.....	5-½	21-½	21-½	...	...	...	5	3	2	...	5
e.....	6-1	3-½	43-½	...	...	...	4	3	1	...	4
f.....	6-1½	3-½	4-½	6-1½*	5-½	...	7	5	2	...	5
g.....	5-½	21-½	3-½	6-1½	...	...	7	4	3	...	5
h.....	6-1½	3-½	12-½	21-½	...	...	6	4	2	...	6
i.....	21-½	...	...	...	...	...	4	1	2	1	2
j.....	3-½	6-1½	...	...	...	...	6	2	3	1	2
k.....	5-¼	5-¼	S H L	2-¾	21-½	...	7	5	2	...	7
l.....	6-1½	3-½	21-½	...	...	...	5	3	2	...	4
m.....	12-½	12-½	12-½	21-½	...	...	6	4	2	...	8
n.....	12-½	12-½	21-½	...	...	...	4	3	1	...	6
o.....	3-½	43-½	4-½	0-¼	...	...	5	4	1	...	5
p.....	12-½	21-½	...	...	...	...	4	2	2	...	4
q.....	5-½	21-½	4-½	6-1½*	5-½	...	7	5	2	...	6
r.....	S V L	9-¾	21-½	...	...	...	5	3	2	...	5
s†.....	87-½	5-½	...	...	...	...	4	2	2	...	3
t.....	21-½	...	...	...	...	...	4	1	3	...	2
u.....	21-½	21-½	...	...	...	...	5	2	3	...	4
v.....	12-½	21-½	S V L	0-¼	...	...	5	4	1	...	7
w.....	12-½	21-½	21-½	S V L	0-¼	...	7	5	2	...	9
x.....	12-½	21-½	...	...	...	...	3	2	1	...	4
y.....	12-½	21-½	3-½	6-1½	...	...	6	4	2	...	6
z.....	12-½	3-½	S H L	4-¾	3-½	6-1½	8	6	2	...	8
							141	88	51	2	133

* Vertical.

† Irregular; see structure of letter, Part III.

(D) TABLE SHOWING THE FORM AND SIZE OF EACH CURVE IN EACH OF THE CAPITAL LETTERS

The Parts in the 26 Capital Letters.

Letter	The Curves*—Sizes in Heights							NO. OF PARTS IN EACH LETTER			No. of Quadrants
								Total Parts	Curves	Straight Lines	
A.....	87- $\frac{1}{2}$	4-1	0- $\frac{1}{2}$	...	...	...	...	5	3	2	4
B.....	43-1 $\frac{1}{2}$	5-1 $\frac{1}{2}$	44-1 $\frac{1}{2}$	SH L	4-1	43- $\frac{1}{2}$	...	7	6	1	10
C.....	87- $\frac{1}{2}$	8- $\frac{1}{2}$	44-3	7-1	...	...	...	4	4	...	6
D.....	7- $\frac{1}{2}$	$\frac{1}{2}$ SHL	2-2 $\frac{1}{2}$	44-3	4-1 $\frac{1}{2}$	...	...	5	5	1	6
E.....	44- $\frac{1}{2}$ 00-1 $\frac{1}{2}$	6- $\frac{1}{2}$	3- $\frac{1}{2}$	4-1	SH L	...	...	10	10	...	13
F.....		87- $\frac{1}{2}$	5- $\frac{1}{2}$	2-2	87- $\frac{1}{2}$	...	...					7	4	3	6
G.....	6-2	3- $\frac{1}{2}$	43-1	87- $\frac{1}{2}$	...	...	...	5	4	2	6
H.....	87- $\frac{1}{2}$	3- $\frac{1}{2}$	4-1 $\frac{1}{2}$	0- $\frac{1}{2}$	...	...	...	5	4	2	5
I.....	0- $\frac{1}{2}$	1-2	87- $\frac{1}{2}$	...	...	...	...	4	3	1	4
J.....	0- $\frac{1}{2}$	1-2 $\frac{1}{2}$	3- $\frac{3}{8}$	6-2 $\frac{1}{2}$	...	...	...	5	4	2	4
K.....	87- $\frac{1}{2}$	1- $\frac{1}{2}$	1- $\frac{1}{2}$	SH L	2- $\frac{1}{2}$	4-1	1- $\frac{1}{2}$	8	7	1	9
L.....	44- $\frac{1}{2}$	6-1 $\frac{1}{2}$	3- $\frac{1}{2}$	7-1	$\frac{1}{2}$ SHL	0-1 $\frac{1}{2}$	0-1 $\frac{1}{2}$	8	7	1	8
M.....	87- $\frac{1}{2}$	21-1	...	...	...	...	...	6	2	4	4
N.....	87- $\frac{1}{2}$	3-1 $\frac{1}{2}$	...	...	...	...	...	4	2	2	3
O.....	3-1 $\frac{1}{2}$	87-1 $\frac{1}{2}$	34-1 $\frac{1}{2}$	$\frac{1}{2}$ 8-1 $\frac{1}{2}$	...	...	...	4	4	...	6
P.....	43-1 $\frac{1}{2}$	5-1 $\frac{1}{2}$	44-1 $\frac{1}{2}$	...	...	...	...	4	3	1	5
Q.....	3-1 $\frac{1}{2}$	87-1 $\frac{1}{2}$	34-1 $\frac{1}{2}$	$\frac{1}{2}$ 8-1 $\frac{1}{2}$	0-1 $\frac{1}{2}$	0-1 $\frac{1}{2}$	...	5	5	...	8
R.....	43-1 $\frac{1}{2}$	5-1 $\frac{1}{2}$	44-1 $\frac{1}{2}$	SH L	4- $\frac{1}{2}$	4-1	1- $\frac{1}{2}$	8	7	1	10
S.....	44- $\frac{1}{2}$	6-1 $\frac{1}{2}$	3- $\frac{1}{2}$	87- $\frac{1}{2}$	...	...	...	5	4	1	6
T.....	87- $\frac{1}{2}$	5- $\frac{1}{2}$	2-2	87- $\frac{1}{2}$	...	...	...	5	4	1	6
U.....	12-1 $\frac{1}{2}$	21-1	21-1	...	...	...	...	5	3	2	6
V.....	12-1 $\frac{1}{2}$	21-1	SV L	9- $\frac{1}{2}$	...	...	...	6	4	2	7
W.....	12-1 $\frac{1}{2}$	21-1	21-1	SV L	9- $\frac{1}{2}$	...	...	8	5	3	9
X.....	12-1 $\frac{1}{2}$	87- $\frac{1}{2}$	3-1	21-1	...	...	...	7	4	3	7
Y.....	12-1	21-1	87- $\frac{1}{2}$	...	...	...	...	4	3	1	6
Z.....	12-1 $\frac{1}{2}$	3-1	SH L	4-1 $\frac{1}{2}$	3-1	6-2 $\frac{1}{2}$	...	7	6	1	8
								156	118	38	172

* Italics indicate some irregularity as that the size indicates breadth of quadrant, or that it is of an exceptional slant, etc. For these see the structure of the letters in Part III.

Second. The Perception of the Letter

1. The perception of the letter involves the percipient act by the sense of sight, and the perceptible quality of the letter, of which only the latter will be considered in this treatise.

2. The design of the writing is that it may be read. Legibility, therefore, is its chief aim, and all else must be subordinated thereto unless it militates against physiological or hygienic laws.

3. The things that contribute to the perceptible quality, that is, to the legibility of the letters, are as follows: (1) There must be a marked contrast between the paper and the writing. Ink should be jet black. (2) The letters should be correct in form. (3) All lines or parts of lines, in excess of what are necessary to make the letters of the correct form, tend to burden or obscure the letters and should be dispensed with. (4) The letters must not be so small that it is difficult to read them. (5) The lines must not be so fine that it is straining to see them. (6) The letters should be properly spaced. This requires a more detailed explanation:—

(6) SPACING

1. This important factor in legibility will be considered under the five divisions, viz.: 1st. the Object of Spacing; 2d. Spacing within the Letters; 3d. Spacing between the Letters; 4th. Spacing between the Words; 5th. Paragraphing, etc.

2. (a) *The Object of Spacing.* Spacing helps to make the characters manifest to the sight. The unit, whether it be a letter in a group or whether it be a word, a line, or a paragraph, must be separated from its associates by so much space that the eyes will readily perceive it as

an individual, or as a distinct part of the composite whole.

3. (b) *Spacing within the Letters.* This is regulated by the upslant and downslant lines and by the breadth of the ovals. These are predetermined, and the spacing within the letter is, therefore, not arbitrary but is fixed by the form of the letter.

4. (c) *Spacing between the Letters.* The space between the letters in a word is also determined. The small letters generally begin and end at half height, and their union fixes the spacing. The eyes are principally influenced by the heavier downlines, and as these by the junction of the terminal and initial lines are made farther apart than within the letters, the space between appears to be greater than the space within the letters. In joining the exceptional letters, the terminals and the initials are slightly modified, and the spacing is made to conform, as near as possible, to the general rule.

5. (d) *Spacing between the Words.* Spacing between the words is arbitrary yet not wholly so. The larger the integers grouped the greater must be the spacing, but the law of harmony prevails throughout. Prominence is not given to words according to their length or their significance, they are presented to the eyes as co-ordinates of a clause and should be spaced alike. This space should be about twice as large as the space between the downlines of the different letters in a word. Where commas, etc., are inserted, the space should be slightly increased, and where periods or other full stops are inserted, the space should be so materially enlarged that the reader will thereby, in advance, be apprised of the end of the clause.

6. (e) *Paragraphing, etc.* To make the page look pleasing to the sight, there should be considerable space

at the top and at the bottom, and a noticeably uniform, marginal space at the sides of the page. The first line of a paragraph should begin from one-fourth of an inch to an inch or more, depending on the size of the writing and of the page, to the right of the lines in the body of the paragraph. The space between the lines should be large enough not to cause the letters to be obscured by close proximity. Where other spacing occurs, the size of the page and of the writing, and the harmony that all should present to the sight, must guide the student's judgment.

Third. The Apprehension of the Letter by the Understanding

1. An untutored mind has crude ideas of shapes, dimensions and directions. The mind can be educated in the apprehension of these, as well as the hand in movement. To this end, as well as in other ways, it will help the student to make printed capitals in the following forms, viz.:



2. The mind becomes fully impressed with the ideal and its make up, that is, these become fixed in the mind,

by presentations of the letter and its component parts, by their thoughtful, thorough analysis, by their composition, and by numerous repetitions of these processes, all of which will be thoroughly gone through with in Part III of the treatise.

PART III

THE STRUCTURE OF THE LETTERS

1. The alphabet consists of two sets of letters—capital and small. As the capitals are used principally as initial letters in words beginning paragraphs or sentences, and in beginning proper names, etc., they occur in a position of prominence and are, therefore, made somewhat larger than the small letters and, *chirographically*, more ornamental. On account of the latter, the capitals are more complicated in structure; and they vary more, that is, the groups of similar letters are smaller. This is shown in that only the *A*, *N* and *M*, the *B*, *P* and *R*, the *F* and *T*, the *I* and *J*, and the *V* and *W*, respectively, are near enough alike to admit of grouping. With this similarity kept in view, the order of arrangement of the capitals will be from the simpler to the more difficult.

2. The small letters group into the chirographic oval group, the *n*, *m*, *u*, *x*, *t*, *i* and *p*,—the seven deriving all their curves from such oval. The next is the loop group, there being ten loop letters; they, however, dovetail into, that is overlap, other groups. The third is the small *a* group, composed of four letters, the *a*, *d*, *g* and *q*. The fourth is the *v*-ending group composed of the *v*, *b*, *o* and *w*. The rest of the letters hardly admit of grouping. The small letters abound in straight lines, no less than twenty-one of the letters having the $22\frac{1}{2}$ degree, downslant lines in them. This slant has forced its way into handwriting as its directionality, because the finger movement is, nat-

urally, the specially adapted movement for handwriting and such directionality is a *fixed* element in that movement. The small letters will be considered first.

NOTE. In studying the structure of the letters, the student will find it convenient to have a 3-inch boxwood scale, graded into 60-30, 50-10, and 40-20; a jewelers' eye-glass, a protractor, and celluloid or other triangles of the different slants. The $\frac{1}{80}$ scale suits the drawings herein.

First. The Small Letters

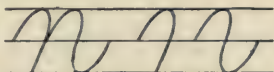
THE 26 SMALL LETTERS

Order of Arrangement.

<i>a</i>	.....Page 127	<i>n</i>	.....	1
<i>b</i>	.....	<i>m</i>	.....	2
<i>c</i>	.....	<i>u</i>	.....	3
<i>d</i>	.....	<i>x</i>	.....	4
<i>e</i>	.....	<i>t</i>	.....	5
<i>f</i>	.....	<i>i</i>	.....	6
<i>g</i>	.....	<i>p</i>	.....	7
<i>h</i>	.....	<i>h</i>	.....	8
<i>i</i>	.....	<i>l</i>	.....	9
<i>j</i>	.....	<i>y</i>	.....	10
<i>k</i>	.....	<i>j</i>	.....	11
<i>l</i>	.....	<i>f</i>	.....	12
<i>m</i>	.....	<i>a</i>	.....	13
<i>n</i>	.....	<i>d</i>	.....	14
<i>o</i>	.....	<i>g</i>	.....	15
<i>p</i>	.....	<i>q</i>	.....	16
<i>q</i>	.....	<i>v</i>	.....	17
<i>r</i>	.....	<i>w</i>	.....	18
<i>s</i>	.....	<i>b</i>	.....	19
<i>t</i>	.....	<i>r</i>	.....	20
<i>u</i>	.....	<i>o</i>	.....	21
<i>v</i>	.....	<i>e</i>	.....	22
<i>w</i>	.....	<i>c</i>	.....	23
<i>x</i>	.....	<i>s</i>	.....	24
<i>y</i>	.....	<i>z</i>	.....	25
<i>z</i>	.....	<i>k</i>	.....	26

(1) THE SMALL LETTER *n**Analysis*

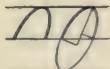
1. The small letter *n* is composed of two parts, thus:



2. The first part consists of two portions, viz.:



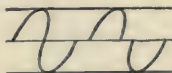
The first portion is a half-height, upper half of the chirographic oval.



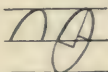
The second portion is a half-height, downslant line.



3. The second part consists of two portions, viz.:



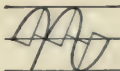
The first portion is a half-height, upper half of the chirographic oval.



The second portion is a half-height, lower half of the chirographic oval.



4. Analytic diagram.

*Composition*

5. Begin on the median line and make a half-height, upper half of the chirographic oval.



Continue, make, downward, a half-height, downslant line.



Lift and place the pen up on the intersection of the median and downline and make a half-height, upper half of the chirographic oval.



Conclude by making a half-height, lower half of the chirographic oval.

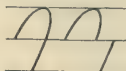


(2) THE SMALL LETTER *m**Analysis*

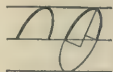
1. The small letter *m* is composed of three parts, thus:



2. The first part consists of two portions, viz.:



The first portion is a half-height, upper half of the chirographic oval.

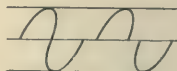


The second portion is a half-height, downslant line.

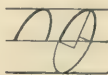


3. The second part is like the first part.

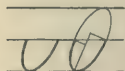
4. The third part consists of two portions, viz.:



The first portion is a half-height, upper half of the chirographic oval.



The second portion is a half-height, lower half of the chirographic oval.



5. Analytic diagram.

*Composition*

6. Begin on the median line and make a half-height, upper half of the chirographic oval.



Continue, make, downward, a half-height, downslant line.



Lift and place the pen up on the intersection of the median and downline and make a half-height, upper half of the chirographic oval.



Continue, make, downward, a half-height, downslant line.



Lift and place the pen up on the intersection of the median and last downline and make a half-height upper half of the chirographic oval.



Conclude by making a half-height, lower half of the chirographic oval.



(3) THE SMALL LETTER *u*

Analysis

1. The small letter *u* is composed of two parts, thus:



2. The first part consists of three portions, viz.:



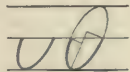
The first portion is a half-height, upslant line.



The second portion is a half-height, downslant line.



The third portion is a half-height, lower half of the chirographic oval.



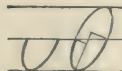
3. The second part consists of two portions, viz.:



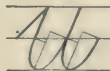
The first portion is a half-height, downslant line.



The second portion is a half-height, lower half of the chirographic oval.



4. Analytic diagram.



Composition

5. Begin on the median line and make a half-height, upslant line.



Continue, make a half-height, downslant line.



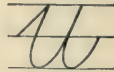
Continue, make a half-height, lower half of the chirographic oval.



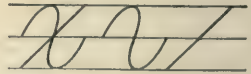
Lift and place the pen up, on line with the downslant, to the upper line of the central space, and make, downward, a half-height, downslant line.



Conclude by making a half-height, lower half of the chirographic oval.

(4) THE SMALL LETTER *x**Analysis*

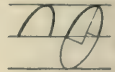
1. The small letter *x* is composed of two parts, thus:



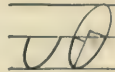
2. The first part consists of two portions, viz.:



The first portion is a half-height, upper half of the chirographic oval.



The second portion is a half-height, lower half of the chirographic oval.



3. The second part is a one-height, upslant line.



4. Analytic diagram.



Composition

5. Begin on the median line and make a half-height, upper half of the chirographic oval.



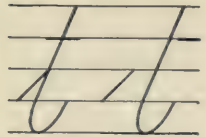
Continue, make a half-height, lower half of the chirographic oval.



Lift and place the pen on the base line, vertically under the point of beginning the first part of the letter, and conclude by making a one-height, upslant line, crossing the intersection of the median and down line.

(5) THE SMALL LETTER *t**Analysis*

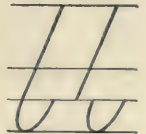
1. The small letter *t* is composed of three parts, thus:



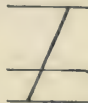
2. The first part is a half-height, upslant line.



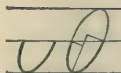
3. The second part consists of two portions, viz.:



The first portion is a one and one-half height, downslant line.

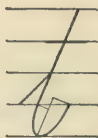


The second portion is a half-height, lower half of the chirographic oval.



4. The third part is a one-breadth, horizontal line.

5. Analytic diagram.



Composition

6. Begin on the median line and make a half-height, upslant line.



Lift and place the pen up on line with the downslant to two heights above the base line, and make, downward, touching the end of the initial line, a one and one-half height, downslant line.



Continue, make a half-height, lower half of the chirographic oval.

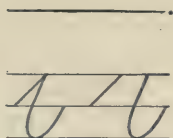


Lift and place the pen up, one and one-half heights above the base line, and a half-breadth to the left of the downslant line, and conclude by crossing the downline with a one-breadth, light, horizontal line.



(6) THE SMALL LETTER *i**Analysis*

1. The small letter *i* is composed of three parts, thus:



2. The first part is a half-height, upslant line.



3. The second part consists of two portions, viz.:



The first portion is a half-height, downslant line.



The second portion is a half-height, lower half of the chirographic oval.



4. The third part is a light, round dot.



5. Analytic diagram.

*Composition*

6. Begin on the median line and make a half-height, upslant line.



Make, downward, a half-height, downslant line.



Continue, make a half-height, lower half of the chirographic oval.



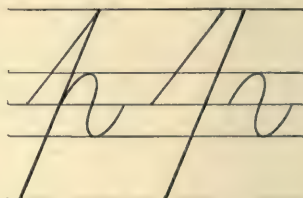
Lift and place the pen over the downslant line and up, on line with its slant, to two heights above the base line, and conclude by making a rather light, round dot.



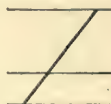
(7) THE SMALL LETTER *p*

Analysis

1. The small letter *p* is composed of three parts, thus:



2. The first part is a one and one-half height, $37\frac{1}{2}$ -degree, upslant line.



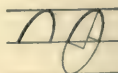
3. The second part is a three-height, downslant line.



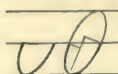
4. The third part consists of two portions, viz.:



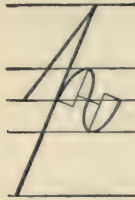
The first portion is a half-height, upper half of the chirographic oval.



The second portion is a half-height, lower half of the chirographic oval.



5. Analytic diagram.

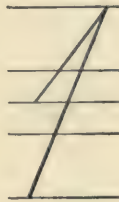


Composition

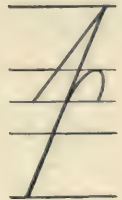
6. Begin on the median line and make, upward, a one and one-half height, 37½-degree, upslant line.



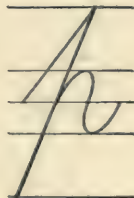
Make, downward, a three-height, downslant line.



Lift and place the pen up on the intersection of the median and downslant line, and make a half-height, upper half of the chirographic oval.

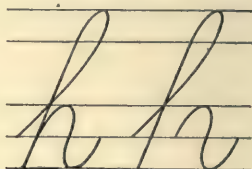


Conclude by making a half-height, lower half of the chirographic oval.

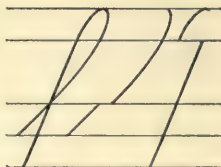


(8) THE SMALL LETTER *h**Analysis*

1. The small letter *h* is composed of two parts, thus:



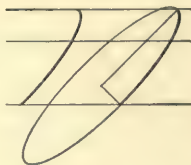
2. The first part consists of four portions, viz.:



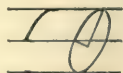
The first portion is a half-height, upslant line.



The second portion is a one and one-half height, upper right, loop quadrant.



The third portion is a half-height, upper left, No. 3 quadrant.



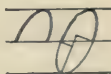
The fourth portion is a two-height, downslant line.



3. The second part consists of two portions, viz.:



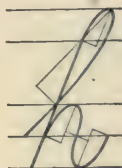
The first portion is a half-height, upper half of the chirographic oval.



The second portion is a half-height, lower half of the chirographic oval.



4. Analytic diagram.

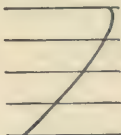


Composition

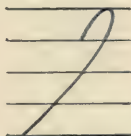
5. Begin on the median line and make a half-height, upslant line.



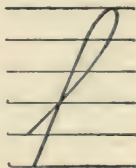
Continue, make, upward, a one and one-half height, upper right, loop quadrant.



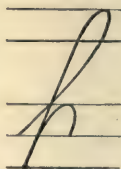
Continue, make, downward, a half-height, upper left, No. 3 quadrant.



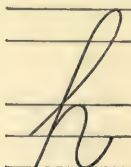
Continue, make, downward, a two-height, downslant line.



Lift and place the pen up on the intersection of the median and downline and make a half-height, upper half of the chirographic oval.



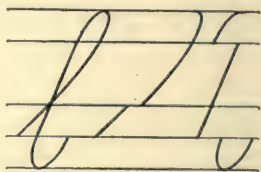
Conclude by making a half-height, lower half of the chirographic oval.



(9) THE SMALL LETTER *l*

Analysis

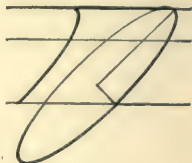
1. The small letter *l* consists of one continuous line composed of five portions, thus:



2. The first portion is a half-height, upslant line.



The second portion is a one and one-half height, upper right, loop quadrant.



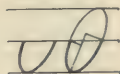
The third portion is a half-height, upper left, No. 3 quadrant.



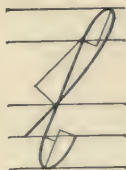
The fourth portion is a one and one-half height, downslant line



The fifth portion is a half-height, lower half of the chirographic oval.



3. Analytic diagram.

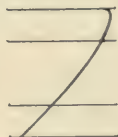


Composition

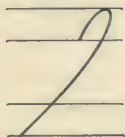
4. Begin on the median line and make a half-height, upslant line.



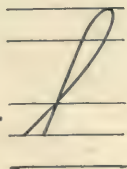
Continue, make, upward, a one and one-half height, upper right, loop quadrant.



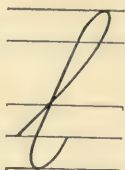
Continue, make, downward, a half-height, upper left, No. 3 quadrant.



Continue, make, downward, a one and one-half height, downslant line.



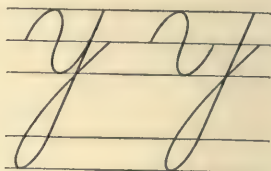
Conclude by making a half-height, lower half of the chirographic oval.



(10) THE SMALL LETTER *y*

Analysis

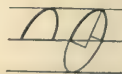
1. The small letter *y* is composed of two parts, thus:



2. The first part consists of two portions, viz.:



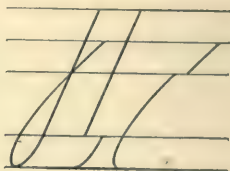
The first portion is a half-height, upper half of the chirographic oval.



The second portion is a half-height, lower half of the chirographic oval.



3. The second part consists of four portions, viz.:



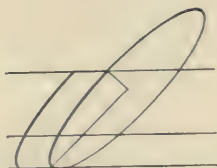
The first portion is a two-height, downslant line.



The second portion is a half-height, lower right, No. 3 quadrant.



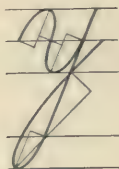
The third portion is a one and one-half height, lower left, loop quadrant.



The fourth portion is a half-height, upslant line.



4. Analytic diagram.



Composition

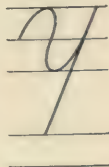
5. Begin on the median line and make a half-height, upper half of the chirographic oval.



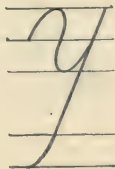
Continue, make a half-height, lower half of the chirographic oval.



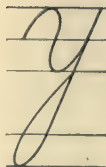
Lift and place the pen up on line with the downslant to the upper line of the central space and make, downward, a two-height, downslant line.



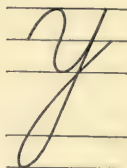
Continue, make, downward, a half-height, lower right, No. 3, quadrant.



Continue, make, upward, a one and one-half height, lower left, loop quadrant.



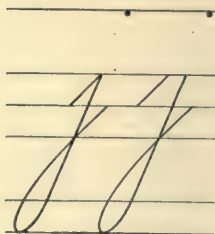
Conclude by making a half-height, upslant line.



(11) THE SMALL LETTER *j*

Analysis

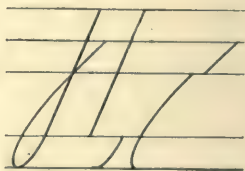
1. The small letter *j* is composed of three parts, thus:



2. The first part is a half-height, upslant line.



3. The second part consists of four portions, viz.:



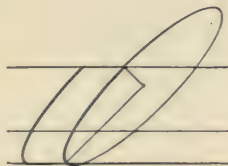
The first portion is a two-height, downslant line.



The second portion is a half-height, lower right, No. 3 quadrant.



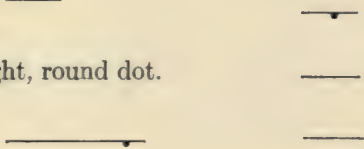
The third portion is a one and one-half height, lower left, loop quadrant.



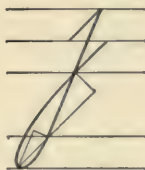
The fourth portion is a half-height, upslant line.



4. The third part is a light, round dot.

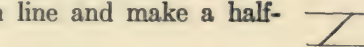


5. Analytic diagram.



Composition

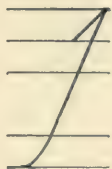
6. Begin on the median line and make a half-height, upslant line.



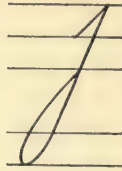
Make, downward, a two-height, downslant line.



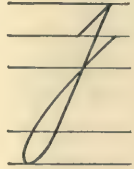
Continue, make, downward, a half-height, lower right, No. 3 quadrant.



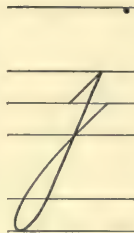
Continue, make, upward,
a one and one-half height,
lower left, loop quad-
rant.



Continue, make a half-height, upslant line.



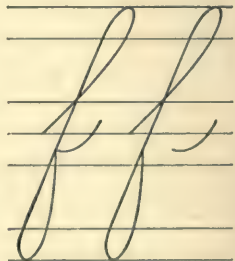
Lift and place the pen
over the downslant line
and up, on line with its
slant, to two heights
above the base line, and
conclude by making a
rather light, round dot.



(12) THE SMALL LETTER *f*

Analysis

1. The small letter *f* is composed
of two parts, thus:

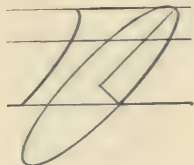


2. The first part consists of six portions, viz.:

The first portion is a half-height, upslant line.



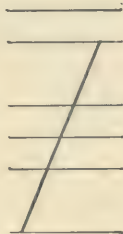
The second portion is a one and one-half height, upper right, loop quadrant.



The third portion is a half-height, upper left, No. 3 quadrant.



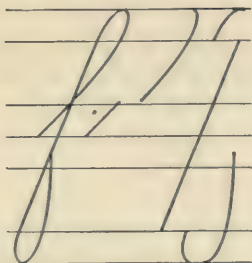
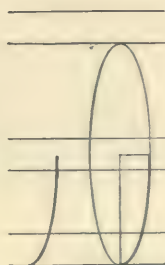
The fourth portion is a three-height, downslant line.



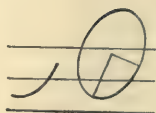
The fifth portion is a half-height, lower left, No. 4 quadrant.



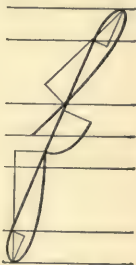
The sixth portion is a one and three-quarter height, lower right, vertical, loop quadrant.



3. The second part is a half-height, lower right, small *a* quadrant.



4. Analytic diagram.

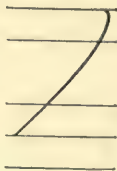


Composition

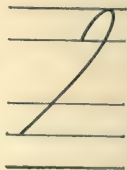
6. Begin on the median line and make a half-height, upslant line.



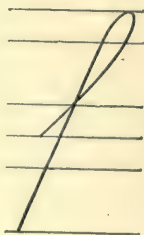
Continue, make, upward, a one and one-half height, upper right, loop quadrant.



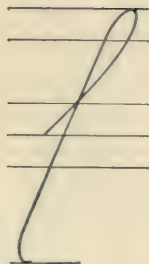
Continue, make, downward, a half-height, upper left, No. 3 quadrant.



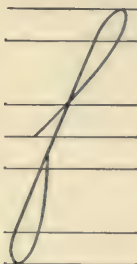
Continue, make, downward, a three-height, downslant line.



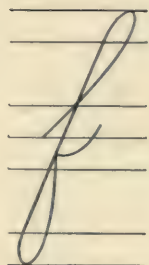
Continue, make, downward and to the right, a half-height, lower left, No. 4 quadrant.



Continue, make, upward, a one and three-quarter height, lower right, vertical, loop quadrant.



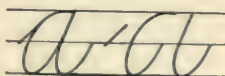
Conclude by making, to the right and upward, a half-height, lower right, small *a* quadrant.



(13) THE SMALL LETTER *a*

Analysis

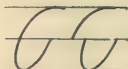
1. The small letter *a* is composed of three parts, thus:



2. The first part is a one-third height, upslant line.



3. The second part consists of two portions, viz.:



The first portion is a half-height, upper left, small *a* quadrant.



The second portion is a half-height, lower half of the chirographic oval.



4. The third part consists of two portions, viz.:



The first portion is a half-height, downslant line.



The second portion is a half-height, lower half of the chirographic oval.



5. Analytic diagram.



Composition

6. Begin on the median line and make a one-third height, upslant line.



Lift and place the pen five-sixths of one breadth to the right, and up, on line with the downslant, to the upper line of the central space, and make, to the left, touching the end of the initial line, a half-height, upper left, small *a* quadrant.



Continue, make a half-height, lower half of the chirographic oval.



Lift and place the pen up on line with the downslant to the upper line of the central space, and make, downward, a half-height downslant line.



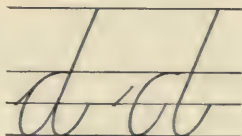
Conclude by making a half-height, lower half of the chirographic oval.



(14) THE SMALL LETTER *d*

Analysis

1. The small letter *d* is composed of three parts, thus:



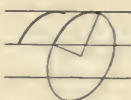
2. The first part is a one-third height upslant line.



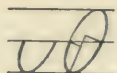
3. The second part consists of two portions, viz.:



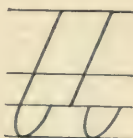
The first portion is a half-height, upper left, small *a* quadrant.



The second portion is a half-height, lower half of the chirographic oval.



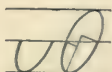
4. The third part consists of two portions, viz.:



The first portion is a one and one-half height, downslant line.



The second portion is a half-height, lower half of the chirographic oval.



5. Analytic diagram.

*Composition*

6. Begin on the median line and make a one-third height, upslant line.



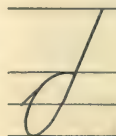
Lift and place the pen five-sixths of one breadth to the right, and up, on line with the downslant, to the upper line of the central space, and make, to the left, touching the end of the initial line, a half-height, upper left, small *a* quadrant.



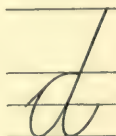
Continue, make a half-height, lower half of the chirographic oval.



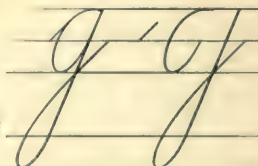
Lift and place the pen up, on line with the downslant, to two heights above the base line, and make, downward, a one and one-half height, downslant line.





Conclude by making a half-height, lower half of the chirographic oval.


(15) THE SMALL LETTER *g**Analysis*

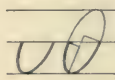
1. The small letter *g* is composed of three parts, thus:



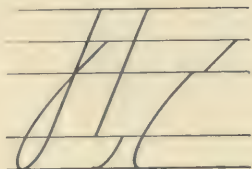
2. The first part is a one-third height, upslant line. 


3. The second part consists of two portions, viz.: 

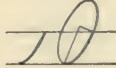
The first portion is a half-height, upper left, small *a* quadrant. 

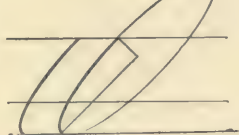
The second portion is a half-height, lower half of the chirographic oval. 


4. The third part consists of four portions, viz.:



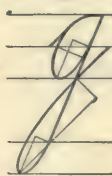
The first portion is a two-height, downslant line. 

The second portion is a half-height, lower right, No. 3 quadrant. 

The third portion is a one and one-half height, lower left, loop quadrant. 

The fourth portion is a half-height, upslant line. 

5. Analytic diagram.



Composition

6. Begin on the median line and make a one-third height, upslant line.



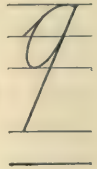
Lift and place the pen five-sixths of one breadth to the right and up, on line with the downslant, to the upper line of the central space, and make, to the left, touching the end of the initial line, a half-height, upper left, small *a* quadrant.



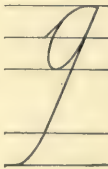
Continue, make a half-height, lower half of the chirographic oval.



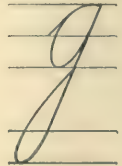
Lift and place the pen up, on line with the downslant, to the upper line of the central space, and make, downward, a two-height, downslant line.



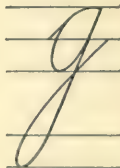
Continue, make, downward, a half-height, lower right, No. 3 quadrant.



Continue, make, upward, a one and one-half height, lower left, loop quadrant.



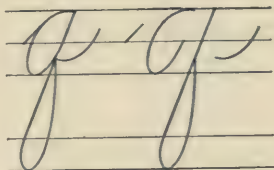
Conclude by making a half-height, upslant line.



(16) THE SMALL LETTER *q*

Analysis

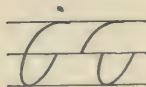
1. The small letter *q* is composed of four parts, thus:



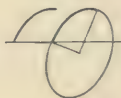
2. The first part is a one-third height, upslant line.



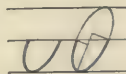
3. The second part consists of two portions, viz.:



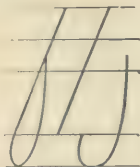
The first portion is a half-height, upper left, small *a* quadrant.



The second portion is a half-height, lower half of the chirographic oval.



4. The third part consists of three portions, viz.:



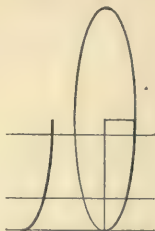
The first portion is a two-height, downslant line.



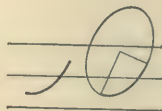
The second portion is a half-height, lower left, No. 4 quadrant.



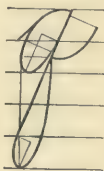
The third portion is a one and three-quarter height, lower right, vertical loop quadrant.



5. The fourth part is a half-height, lower right, small *a* quadrant.



6. Analytic diagram.



Composition

7. Begin on the median line and make, upward, a one-third height, upslant line.



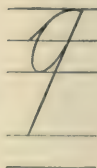
Lift and place the pen five-sixths of one breadth to the right, and up, on line with the downslant, to the upper line of the central space, and make, to the left, touching the end of the initial line, a half-height, upper left, small *a* quadrant.



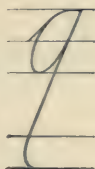
Continue, make a half-height, lower half of the chirographic oval.



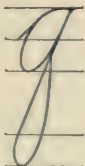
Lift and place the pen up, on line with the downslant, to the upper line of the central space, and make, downward, a two-height, downslant line.



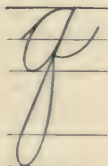
Continue, make, downward, a half-height, lower left, No. 4 quadrant.



Continue, make, upward, a one and three-quarter height, lower right, vertical, loop quadrant.



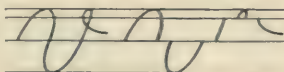
Conclude by making a half-height, lower right, small *a* quadrant.



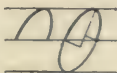
(17) THE SMALL LETTER *v*

Analysis

1. The small letter *v* consists of one continuous line composed of five portions, thus:



2. The first portion is a half-height, upper half of the chirographic oval.



The second portion is a half-height, lower half of the chirographic oval.



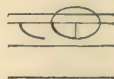
The third portion is a three-eighth height, light, downslant line.



The fourth portion is a one-eighth height, upper small vertical loop.



The fifth portion is a quarter-height, lower left, horizontal oval quadrant (the No. 0).



3. Analytic diagram.



Composition

4. Begin on the median line and make a half-height, upper half of the chirographic oval.



Continue, make a half-height, lower half of the chirographic oval.



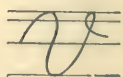
Continue, make, upward, a light, three-eighth height, downslant line.



Continue, make, upward and to the left, a one-eighth height, upper small vertical loop.



Conclude by making, downward and to the right, a quarter-height, lower left, horizontal oval quadrant (the No. 0).



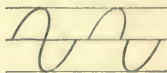
(18) THE SMALL LETTER *w*

Analysis

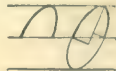
1. The small letter *w* is composed of two parts, thus:



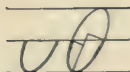
2. The first part consists of two portions, viz.:



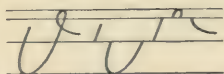
The first portion is a half-height, upper half of the chirographic oval.



The second portion is a half-height, lower half of the chirographic oval.



3. The second part consists of five portions, viz.:



The first portion is a quarter-height, downslant line.



The second portion is a half-height, lower half of the chirographic oval.



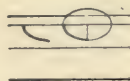
The third portion is a three-eighth height, light, downslant line.



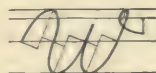
The fourth portion is a one-eighth height, upper small vertical loop.



The fifth portion is a quarter-height, lower left, horizontal oval quadrant.



4. Analytic diagram.

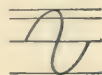


Composition

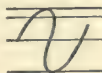
5. Begin on the median line and make a half-height, upper half of the chirographic oval.



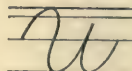
Continue, make a half-height, lower half of the chirographic oval.



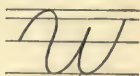
Lift and place the pen up, on line with the downslant, to three-fourths the height of the letter and make, downward, a quarter-height, downslant line.



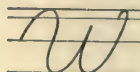
Continue, make a half-height, lower half of the chirographic oval.



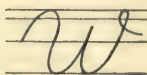
Continue, make, upward, a light, three-eighth height, downslant line.



Continue, make, upward and to the left, a one-eighth height, upper small vertical loop.



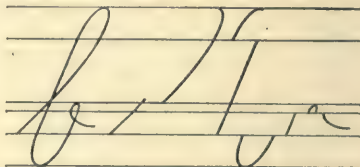
Conclude by making, downward and to the right, a quarter-height, lower left, horizontal oval quadrant (the No. 0).



(19) THE SMALL LETTER *b*

Analysis

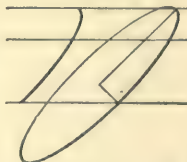
1. The small letter *b* consists of one continuous line composed of eight portions, thus:



2. The first portion is a half-height, upslant line.



The second portion is a one and one-half height, upper right, loop quadrant.



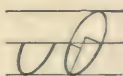
The third portion is a half-height, upper left, No. 3 quadrant.



The fourth portion is a one and one-half height, downslant line.



The fifth portion is a half-height, lower half of the chirographic oval.



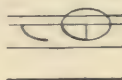
The sixth portion is a three-eighth height, light, downslant line.



The seventh portion is a one-eighth height, upper small vertical loop.



The eighth portion is a quarter-height, lower left, horizontal oval quadrant (the No. 0).



3. Analytic diagram.

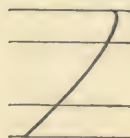


Composition

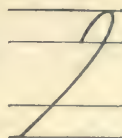
4. Begin on the median line and make a half-height, upslant line.



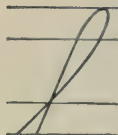
Continue, make, upward, a one and one-half height, upper right, loop quadrant.



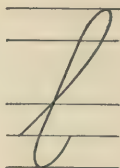
Continue, make, downward, a half-height, upper left, No. 3 quadrant.



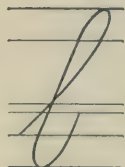
Continue, make, downward, a one and one-half height, downslant line.



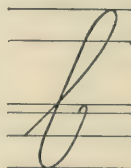
Continue, make a half-height, lower half of the chirographic oval.



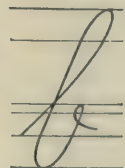
Continue, make, upward, a light, three-eighth height, downslant line.



Continue, make, upward and to the left, a one-eighth height, small vertical loop.



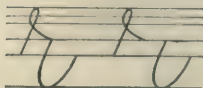
Conclude by making, downward and to the right, a quarter-height, lower left, horizontal oval quadrant (the No. 0).



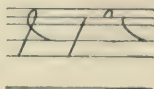
(20) THE SMALL LETTER *r*

Analysis

1. The small letter *r* is composed of two parts, thus:



2. The first part consists of three portions, viz.:



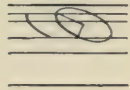
The first portion is a five-eighth height, light, downslant line.



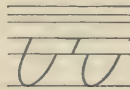
The second portion is a one-eighth height, upper small vertical loop.



The third portion is a three-eighth height lower left, small *r* quadrant (the No. 9).



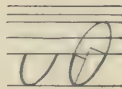
3. The second part consists of two portions, viz.:



The first portion is a quarter-height, downslant line.



The second portion is a half-height, lower half of the chirographic oval.



4. Analytic diagram.



Composition

5. Begin on the median line and make, upward, a light, five-eighth height, downslant line.



Continue, make, upward and to the left, a one-eighth height, upper small vertical loop.



Continue, make, downward and to the right, a one-breadth, three-eighth height, lower left, small *r* quadrant (the No. 9) with its minor axis on line with the downslant.



Make, downward, a quarter-height, downslant line.



Conclude by making a half-height, lower half of the chirographic oval.



(21) THE SMALL LETTER o

Analysis

1. The small letter o is composed of two parts, thus:



2. The first part is a three-eighth height, upslant line.



3. The second part consists of four portions, viz.:



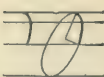
The first portion is a half-height, upper left, No. 3 quadrant.



The second portion is a half-height, lower half of the oval.



The third portion is a half-height, upper right, No. 4 quadrant.



The fourth portion is a quarter-height, three-quarter breadth, lower left, horizontal oval quadrant (the No. 0).



4. Analytic diagram.



Composition

5. Begin on the median line and make a three-eighth height, upslant line.



Lift and place the pen to the right, three-fourths of one breadth from the starting point and up, on line with the downslant, to the upper line of the central space, and make, downward, touching the end of the initial line, a half-height, upper left, No. 3 quadrant.



Continue, make, downward and to the right, a half-height, lower half of the oval.



Continue, make, upward, a half-height, upper right, No. 4 quadrant.



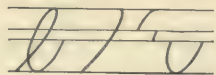
Conclude by making, downward and to the right, a quarter-height, three-quarter breadth, lower left, horizontal oval quadrant (the No. 0).



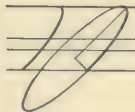
(22) THE SMALL LETTER *e*

Analysis

1. The small letter *e* consists of one continuous line composed of four portions, thus:



2. The first portion is a one-height, upper right, loop quadrant.



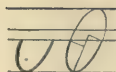
The second portion is a one-third height, upper left, No. 3 quadrant.



The third portion is a one-sixth height, downslant line.



The fourth portion is a half-height, lower half of the oval.



3. Analytic diagram.



Composition

4. Begin on the base line and make, upward, a one-height, upper right, loop quadrant.



Continue, make, downward, a one-third height, upper left, No. 3 quadrant.



Continue, make, downward to half the height of the letter, a downslant line.



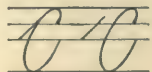
Conclude by making, downward and to the right, a half-height, lower half of the oval.



(23) THE SMALL LETTER *c*

Analysis

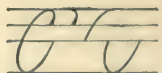
1. The small letter *c* is composed of two parts, thus:



2. The first part is a three-eighth height, upslant line.



3. The second part consists of three portions, viz.:



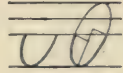
The first portion is a quarter-height, upper right, No. 4 quadrant, begun in a pear-shaped tick.



The second portion is a half-height, upper left, No. 3 quadrant.



The third portion is a half-height, lower half of the oval.



4. Analytic diagram.



Composition

5. Begin on the median line and make a three-eighth height, upslant line.



Lift and place the pen one-breadth to the right of the starting point and up, on line with the downslant, to the length of a pear-shaped tick above three-fourths of one height from the base line, and make, downward, a pear-shaped tick, heavy end downward, and, retracing through its right edge, make, upward, a quarter-height, upper right, No. 4 quadrant.



Continue, make, downward, touching the end of the initial line, a half-height, upper left, No. 3 quadrant.



Conclude by making, downward and to the right, a half-height, lower half of the oval.



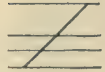
(24) THE SMALL LETTER *s*

Analysis

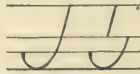
1. The small letter *s* is composed of three parts, thus:



2. The first part is a one-height, upslant line.



3. The second part consists of two portions, viz.:



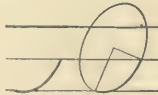
The first portion is a half-height, 15 degree, downslant line.



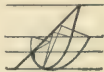
The second portion is a half-height, lower right and the lower half of a half-height, lower left quadrant of a 15 degree, downslant, broad oval, ending in a pear-shaped tick.



4. The third part is a half-height, lower right, small *a* quadrant.



5. Analytic diagram.



Composition

6. Begin on the base line and make a one-height, upslant line.



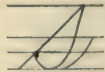
Make downward a half-height, 15 degree, downslant line.



Continue, make downward a half-height, lower right and the lower half of a half-height, lower left quadrant of a 15 degree, downslant, broad oval, ending it in a pear-shaped tick, heavy end upward.

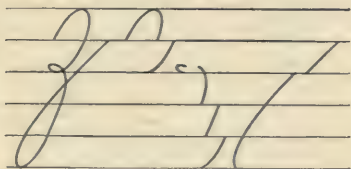


Retrace to the point where the two quadrants join and conclude by making to the right and upward a half-height, lower right, small *a* quadrant.



(25) THE SMALL LETTER *z**Analysis*

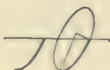
1. The small letter *z* consists of one continuous line, composed of eight portions, thus:



2. The first portion is a half-height, upper half of the chirographic oval.



The second portion is a half-height, lower right, No. 3 quadrant.



The third portion is a quarter-breadth, left small horizontal loop.



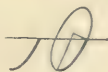
The fourth portion is a five-eighth height, upper right, No. 4 quadrant.



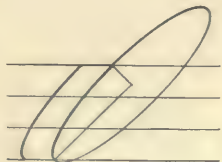
The fifth portion is a half-height downslant line.



The sixth portion is a half-height, lower right, No. 3 quadrant.



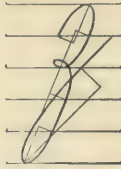
The seventh portion is a one and one-half height, lower left, loop quadrant.



The eighth portion is a half-height, upslant line.

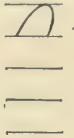


3. Analytic diagram.

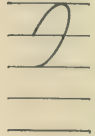


Composition

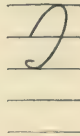
4. Begin on the median line and make a half-height, upper half of the chirographic oval.



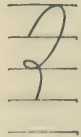
Continue, make, downward, a half-height, lower right, No. 3 quadrant.



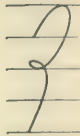
Continue, make, to the left and upward, a quarter-breadth, left small horizontal loop.



Continue, make, downward, a five-eighth height, upper right, No. 4 quadrant.



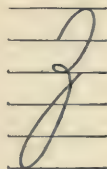
Continue, make, downward, a half-height, down-slant line.



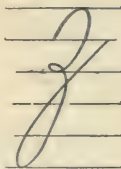
Continue, make, downward, a half-height, lower right, No. 3 quadrant.



Continue, make, upward, a one and one-half height, lower left, loop quadrant.



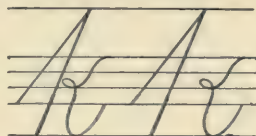
Conclude by making a half-height, upslant line.



(26) THE SMALL LETTER *k*

Analysis

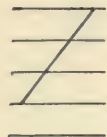
1. The small letter *k* is composed of two parts, thus



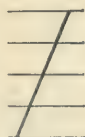
2. The first part consists of two portions, viz.:



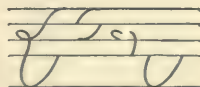
The first portion is a one and one-half height, $37\frac{1}{2}$ degree, upslant line.



The second portion is a two-height, downslant line.



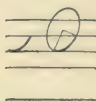
3. The second part consists of five portions, viz.:



The first portion is a quarter-height, upper left, small *a* quadrant.



The second portion is a quarter-height, lower right, small *a* quadrant.



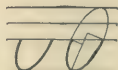
The third portion is a one-quarter breadth, left small horizontal loop.



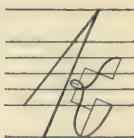
The fourth portion is a three-eighth height, upper right, No. 2 quadrant.



The fifth portion is a half-height, lower half of the chirographic oval.



4. Analytic diagram.



Composition

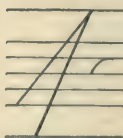
5. Begin on the median line and make a one and one-half height $37\frac{1}{2}$ degree, upslant line.



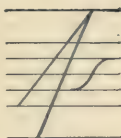
Continue, make downward a two-height, downslant line.



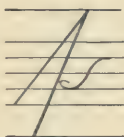
Lift and place the pen a quarter-height above the upper line of the central space and one and a fourth breadth to the right of the downslant line, and make, downward, a quarter-height, upper left, small *a* quadrant.



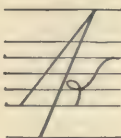
Continue, make, downward, a quarter-height, lower right, small *a* quadrant.



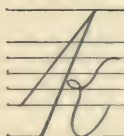
Continue, make, to the left and upward, touching the downslant line, a quarter breadth, left small horizontal loop.



Continue, make downward a three-eighth height, upper right No. 2 quadrant.



Conclude by making a half-height, lower half of the chirographic oval.



NOTE. Some of the letters as, for example, the small *z* and the capitals *Z* and *E*, are very complicated; but the author is not to blame for that. He has not devised, has not *originated*, the letters—he has analyzed the forms as he found them.

Second. The Capital Letters

THE 26 CAPITAL LETTERS

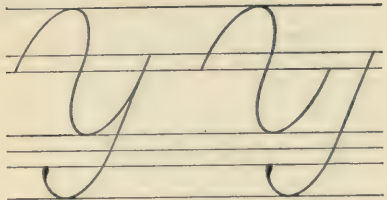
Order of Arrangement.

<i>A</i>	Page 166	<i>Y</i>	1
<i>B</i>	190	<i>G</i>	2
<i>C</i>	168	<i>H</i>	3
<i>D</i>	185	<i>N</i>	4
<i>E</i>	223	<i>M</i>	5
<i>F</i>	199	<i>A</i>	6
<i>G</i>	155	<i>C</i>	7
<i>H</i>	157	<i>O</i>	8
<i>I</i>	202	<i>Q</i>	9
<i>J</i>	204	<i>U</i>	10
<i>K</i>	220	<i>V</i>	11
<i>L</i>	213	<i>W</i>	12
<i>M</i>	163	<i>D</i>	13
<i>N</i>	160	<i>P</i>	14
<i>O</i>	170	<i>B</i>	15
<i>P</i>	188	<i>R</i>	16
<i>Q</i>	172	<i>T</i>	17
<i>R</i>	193	<i>F</i>	18
<i>S</i>	211	<i>I</i>	19
<i>T</i>	196	<i>J</i>	20
<i>U</i>	176	<i>X</i>	21
<i>V</i>	178	<i>S</i>	22
<i>W</i>	181	<i>L</i>	23
<i>X</i>	208	<i>Z</i>	24
<i>Y</i>	153	<i>K</i>	25
<i>Z</i>	216	<i>E</i>	26

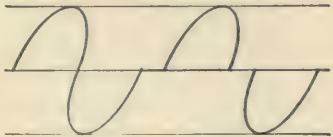
(1) THE CAPITAL LETTER Y

Analysis

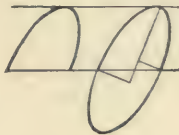
1. The capital letter Y is composed of two parts, thus:



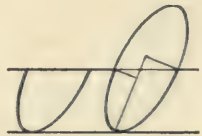
2. The first part consists of two portions, viz.:



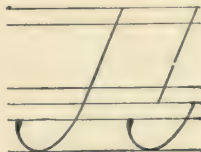
The first portion is a one-height, upper half of the chirographic oval.



The second portion is a one-height, lower half of the chirographic oval.



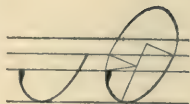
3. The second part consists of two portions, viz.:



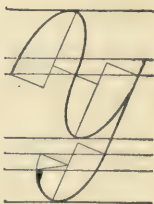
The first portion is a one and one-half height, downslant line.



The second portion is a three-quarter height, lower right and the lower two-thirds of a three-quarter height lower left quadrant of the broad oval, ending in a pear-shaped tick.



4. Analytic diagram.

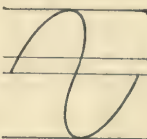


Composition

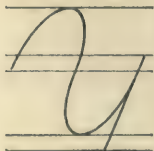
5. Begin at two heights above the base line and make a one-height, upper half of the chirographic oval.



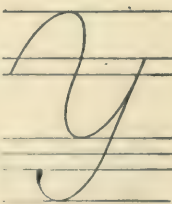
Continue, make a one-height, lower half of the chirographic oval.



Lift and place the pen up, on line with the downslant, to three-fourths the height of the letter and make, downward, a one and one-half height, downslant line.



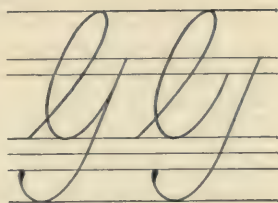
Conclude by making, downward, a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending it in a pear-shaped tick, heavy end upward.



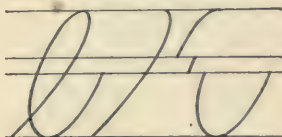
(2) THE CAPITAL LETTER G

Analysis

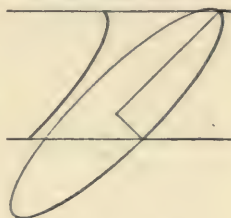
1. The capital letter G is composed of two parts, thus:



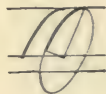
2. The first part consists of four portions, viz.:



The first portion is a two-height upper right, loop quadrant.

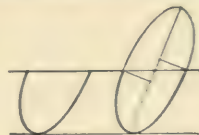


The second portion is a three-quarter height, upper left, No. 3 quadrant.

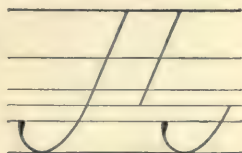


The third portion is a quarter-height, downslant line. Z

The fourth portion is a one-height, lower half of the oval.



3. The second part consists of two portions, viz.:



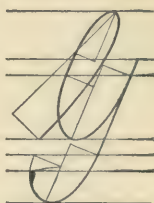
The first portion is a one and one-half height, downslant line.



The second portion is a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending in a pear-shaped tick.

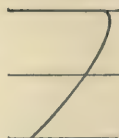


4. Analytic diagram.



Composition

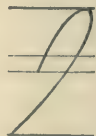
5. Begin at one height above the base line and make, upward, a two-height, upper right, loop quadrant.



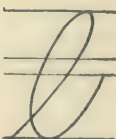
Continue, make, downward, a three-quarter height, upper left, No. 3 quadrant.



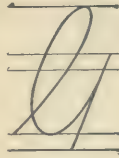
Continue, make, downward, a quarter-height, downslant line.



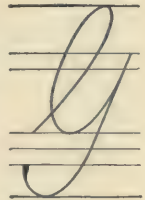
Continue, make, downward and to the right, a one-height, lower half of the oval.



Lift and place the pen up, on line with the downslant, to three-fourths the height of the letter, and make, downward, a one and one-half height, downslant line.



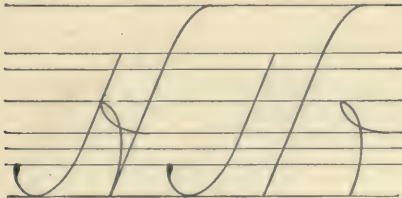
Conclude by making, downward, a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending it in a pear-shaped tick, heavy end upward.



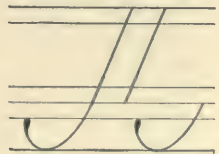
(3) THE CAPITAL LETTER *H*

Analysis

1. The capital letter *H* is composed of three parts, thus:



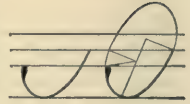
2. The first part consists of two portions, viz.:



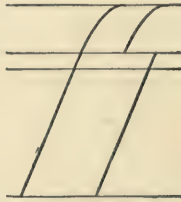
The first portion is a one and one-half height, downslant line.



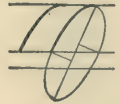
The second portion is a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending in a pear-shaped tick.



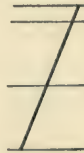
3. The second part consists of two portions, viz.:



The first portion is a three-quarter height, upper left, No. 3 quadrant.



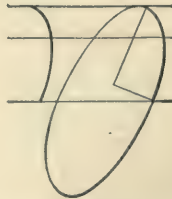
The second portion is a two and one-quarter height, downslant line.



4. The third part consists of two portions, viz.:



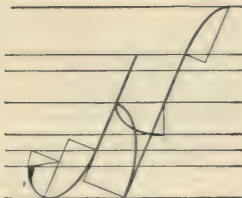
The first portion is a one and one-half height, upper right, No. 4 quadrant.



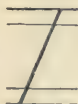
The second portion is a half-height, lower left, horizontal oval quadrant (the No. 0).



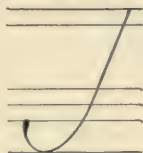
5. Analytic diagram.

*Composition*

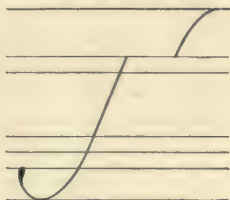
6. Begin at three-fourths height of the letter and make, downward, a one and one-half height, downslant line.



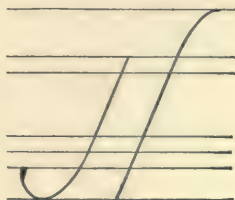
Continue, make, downward, a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending it in a pear-shaped tick heavy end upward.



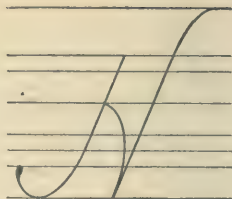
Lift and place the pen up, on line with the downslant line, to the height of the letter and two and one-quarter breadths to the right, and make, downward, a three-quarter height, upper left, No. 3 quadrant.



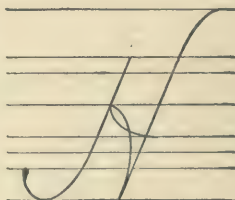
Continue make downward a two and one-quarter height, downslant line.



Make, upward, a one and one-half height, upper right, No. 4 quadrant.



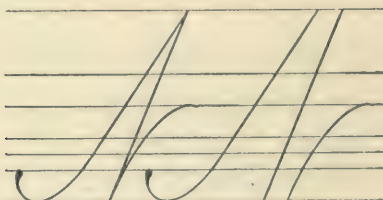
Conclude by making, downward and to the right, a half-height, lower left, horizontal oval quadrant (the No. 0).



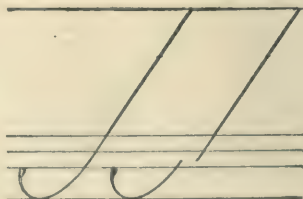
(4) THE CAPITAL LETTER N

Analysis

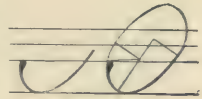
1. The capital letter *N* is composed of three parts, thus:



2. The first part consists of two portions, viz.:



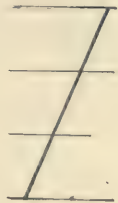
The first portion is the lower two-thirds of the lower left, begun in a pear-shaped tick, and the lower right quadrant of the one and one-half height, broad oval, with its major axis on line with the capital *M* upslant.



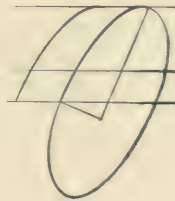
The second portion is a two and two-fifths height, capital *M* upslant line.



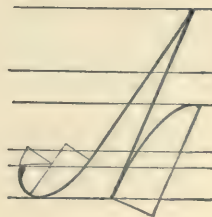
3. The second part is a three-height, downslant line.



4. The third part is a one and one-half height, upper left, No. 3 quadrant.

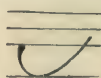


5. Analytic diagram.

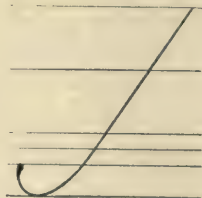


Composition

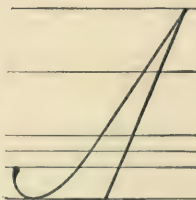
6. Begin at half of one height above the base line, in a pear-shaped tick heavy end upward, and make, downward and to the right, the lower two-thirds of the lower left and the lower right quadrant of the one and one-half height, broad oval, with its major axis on line with the capital *M* upslant.



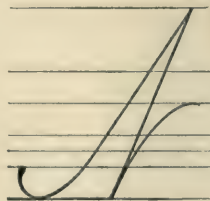
Continue, make, upward, a capital *M* upslant line extending to the height of the letter.



Make, downward, a three-height, downslant line.

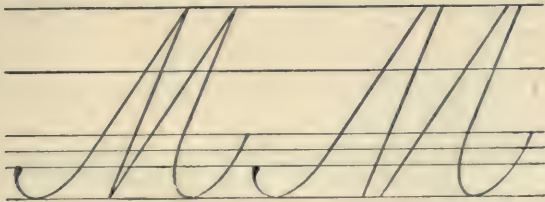


Conclude by making, upward, a one and one-half height, upper left, No. 3 quadrant.

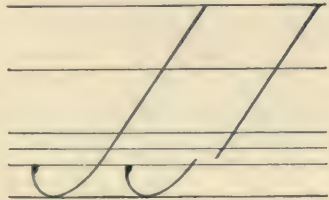


(5) THE CAPITAL LETTER *M**Analysis*

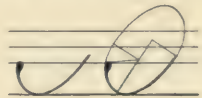
1. The capital letter *M* is composed of four parts, thus:



2. The first part consists of two portions, viz.:



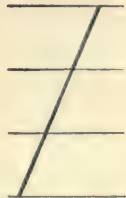
The first portion is the lower two-thirds of the lower left, begun in a pear-shaped tick, and the lower right quadrant of the one and one-half height, broad oval with its major axis on line with the capital *M* upslant.



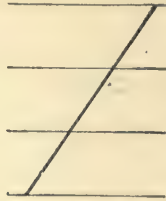
The second portion is a two and two-fifths height, capital *M* upslant line.



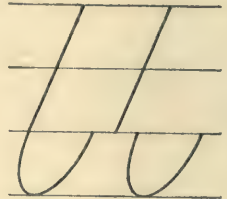
3. The second part is a three-height, downslant line.



4. The third part is a three-height, capital *M* upslant line.



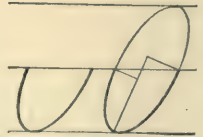
5. The fourth part consists of two portions, viz.:



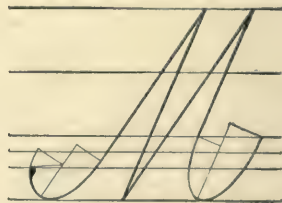
The first portion is a two-height, downslant line.



The second portion is a one-height, lower half of the chirographic oval.

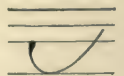


6. Analytic diagram.

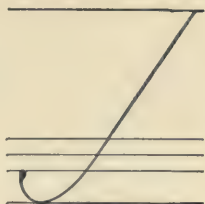


Composition

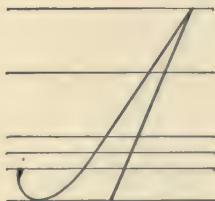
7. Begin at half a height above the base line, in a pear-shaped tick heavy end upward, and make, downward and to the right, the lower two-thirds of the lower left and the lower right quadrant of the one and one-half height, broad oval, with its major axis on line with the capital *M* upslant.



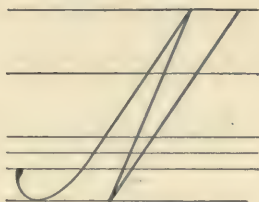
Continue, make, upward a capital *M* upslant line extending to the height of the letter.



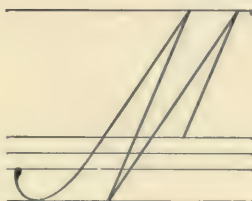
Make, downward, a three-height, downslant line.



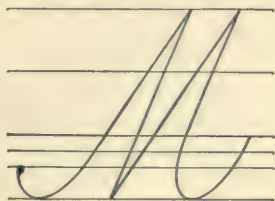
Make, upward, a three-height, capital *M* upslant line.



Make, downward, a two-height, downslant line.



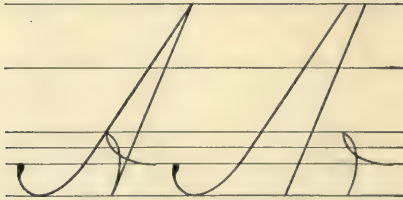
Conclude by making a one-height, lower half of the chirographic oval.



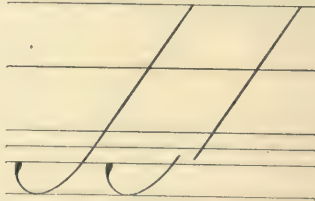
(6) THE CAPITAL LETTER A

Analysis

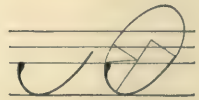
1. The capital letter *A* is composed of three parts, thus:



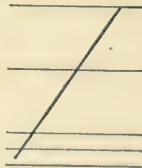
2. The first part consists of two portions, viz.:



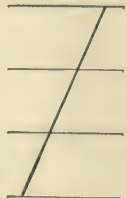
The first portion is the lower two-thirds of the lower left, begun in a pear-shaped tick, and the lower right quadrant of a one and one-half height, broad oval, with its major axis on line with the capital *M* upslant.



The second portion is a two and two-fifths height, capital *M* upslant line.



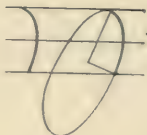
3. The second part is a three-height, downslant line.



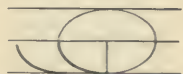
4. The third part consists of two portions, viz.:



The first portion is a one-height, upper right, No. 4 quadrant.



The second portion is a half height, lower left, horizontal oval quadrant (the No. 0).



5. Analytic diagram.

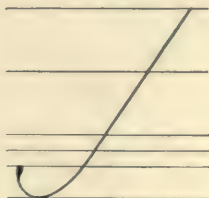


Composition

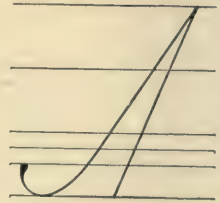
6. Begin at half a height above the base line, in a per-shaped tick heavy end upward, and make, downward and to the right, the lower two-thirds of the lower left, and the lower right quadrant of the one and one-half height, broad oval, with its major axis on line with the capital *M* upslant.



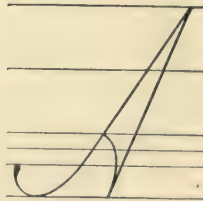
Continue, make, upward, a capital *M* upslant line extending to the height of the letter.



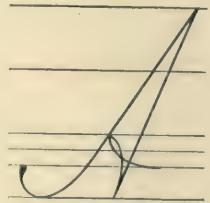
Make, downward, a three-height, downslant line.



Make, upward, a one-height, upper right, No. 4 quadrant.



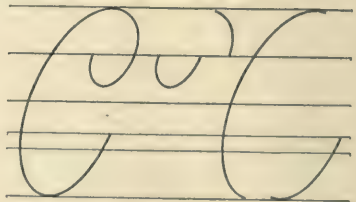
Conclude by making, downward and to the right, a half height, lower left, horizontal oval quadrant (the No. 0).



(7) THE CAPITAL LETTER C

Analysis

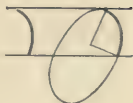
1. The capital letter *C* consists of one, continuous line composed of four portions, thus:



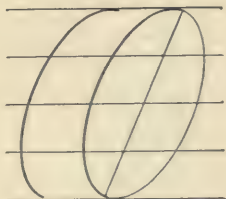
2. The first portion is a half-height, lower half of the broad oval.



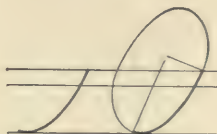
The second portion is a three-quarter height, upper right, No. 8 quadrant.



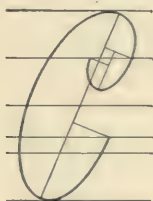
The third portion is a three-height, left half of the No. 4 ellipse.



The fourth portion is a one-height, lower right, No. 7 quadrant.



3. Analytic diagram.

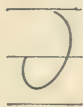


Composition

4. Begin at three-fourths the height of the letter and make, downward and to the left, a half-height, lower half of the broad oval.

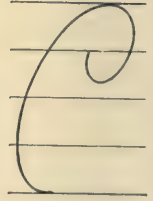


Continue, make, upward, a three-quarter height, upper right, No. 8 quadrant.

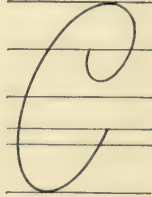


right

Continue, make, to the left and downward, a three-height, left half of the No. 4 ellipse.



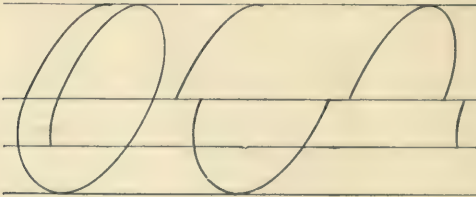
Conclude by making, to the left and upward, a one-height, lower right, No. 7 quadrant.



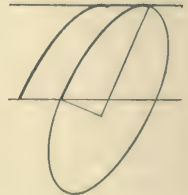
(8) THE CAPITAL LETTER *O*

Analysis

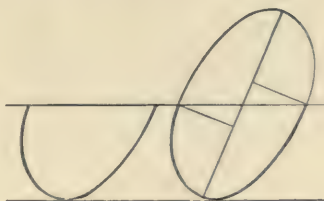
1. The capital letter *O* consists of one continuous line composed of four portions, thus:



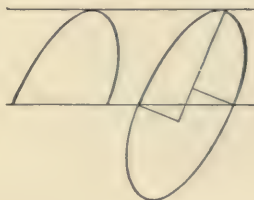
2. The first portion is a one and one-half height, upper left, No. 3 quadrant.



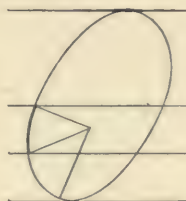
The second portion is a one and one-half height, lower half of the broad oval.



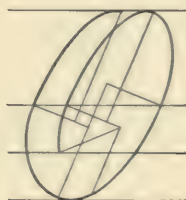
The third portion is a one and one-half height, upper half of the oval.



The fourth portion is the upper half of a one and one-half height, lower left, No. 8 quadrant.

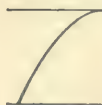


3. Analytic diagram.

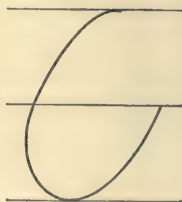


Composition

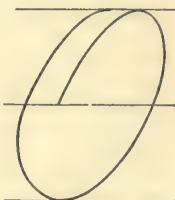
4. Begin at three heights above the base line and make, downward, a one and one-half height, upper left, No. 3 quadrant.



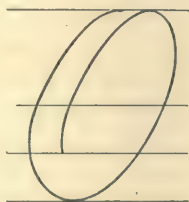
Continue, make, downward and to the right, a one and one-half height, lower half of the broad oval.



Continue, make, upward and to the left, a one and one-half height, upper half of the oval.



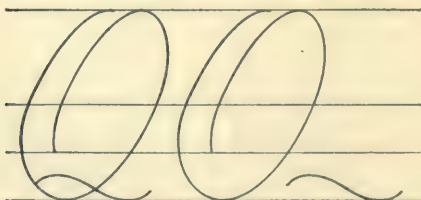
Conclude by making, downward, the upper half of a one and one-half height, lower left, No. 8 quadrant.



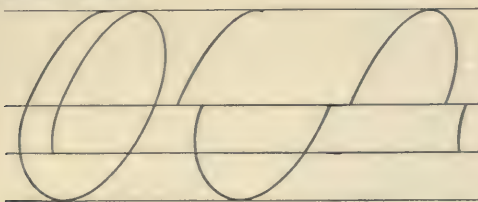
(9) THE CAPITAL LETTER Q

Analysis

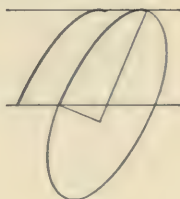
1. The capital letter Q is composed of two parts, thus:



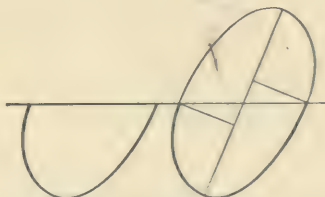
2. The first part is like the capital *O* and consists of four portions, viz.:



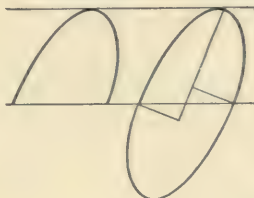
The first portion is a one and one-half height, upper left, No. 3 quadrant.



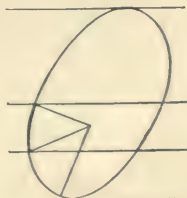
The second portion is a one and one-half height, lower half of the broad oval.



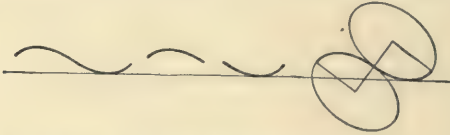
The third portion is a one and one-half height, upper half of the oval.



The fourth portion is the upper half of a one and one-half height lower left. No. 8 quadrant.



3. The second part consists of two portions, viz.:



The first portion is a one and three-quarter breadth, upper left quadrant of the horizontal oval (the No. 0), with its minor axis on a 35-degree slant.



The second portion is a lower right quadrant of the same oval with its minor axis on the same slant.



4. Analytic diagram.

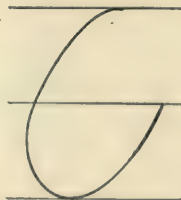


Composition

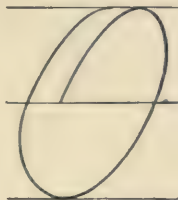
5. Begin at the height of the letter and make, downward, a one and one-half height, upper left, No. 3 quadrant.



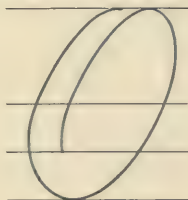
Continue, make, downward and to the right, a one and one-half height, lower half of the broad oval.



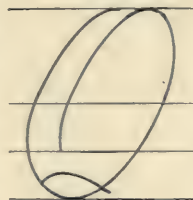
Continue, make, upward and to the left, a one and one-half height, upper half of the oval.



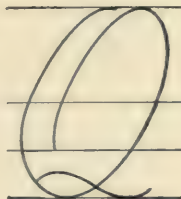
Continue, make, downward the upper half of a one and one-half height, lower left, No. 8 quadrant.



Lift and place the pen on the lower part of the letter, one-half breadth to the left from where the two quadrants join and make, to the right, a one and three-quarter breadth, upper left quadrant of the horizontal oval (the No. 0), with its minor axis on a 35-degree slant.

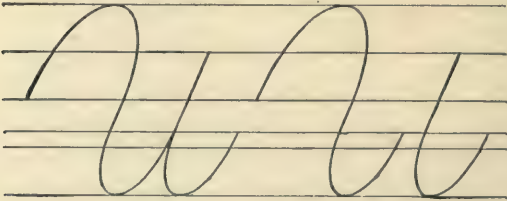


Conclude by making to the right a lower right quadrant of the same oval with its minor axis on the same slant.

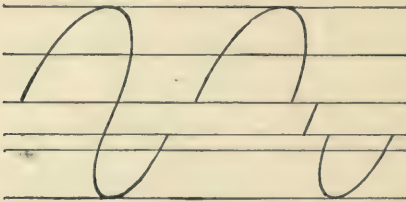


(10) THE CAPITAL LETTER *U**Analysis*

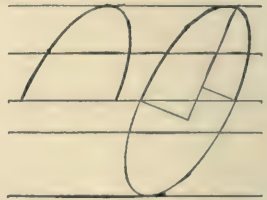
1. The capital letter *U* is composed of two parts, thus:



2. The first part consists of three portions, viz.:

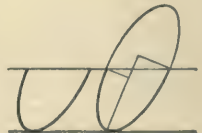


The first portion is a one and one-half height, upper half of the chirographic oval.

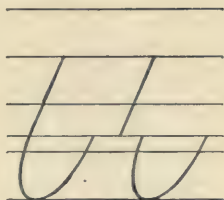


The second portion is a half-height, downslant line. *I*

The third portion is a one-height, lower half of the chirographic oval.



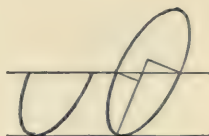
3. The second part consists of two portions, viz.:



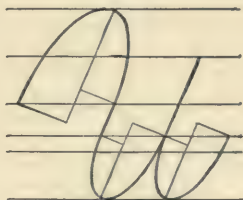
The first portion is a one and one-quarter height, downslant line.



The second portion is a one-height, lower half of the chirographic oval.



4. Analytic diagram.

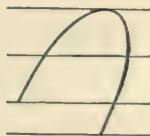


Composition

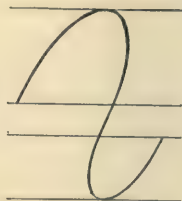
5. Begin at half-height of the letter and make a one and one-half height, upper half of the chirographic oval.



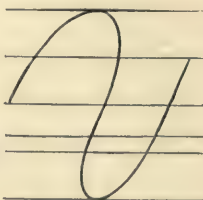
Continue, make, downward, a half-height, downslant line.



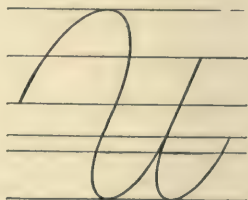
Continue, make a one-height, lower half of the chirographic oval.



Lift and place the pen up, on line with the downslant, to three-fourths height of the letter, and make, downward, a one and one-quarter height, downslant line.



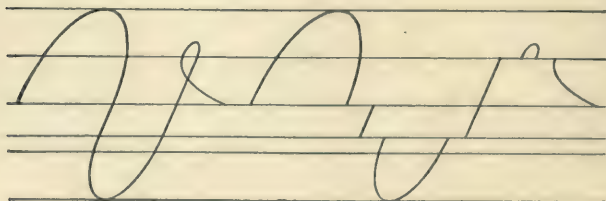
Conclude by making a one-height, lower half of the chirographic oval.



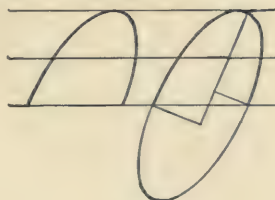
(11) THE CAPITAL LETTER V

Analysis

1. The capital letter *V* consists of one continuous line composed of six portions, thus:



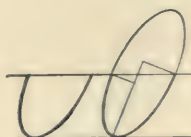
2. The first portion is a one and one-half height, upper half of the chirographic oval.



The second portion is a half height, downslant line.



The third portion is a one-height, lower half of the chirographic oval.



The fourth portion is a light, one and one-quarter height, downslant line.



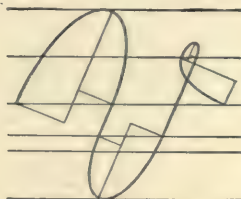
The fifth portion is a quarter height, upper small vertical loop.



The sixth portion is a three-quarter height, lower left, small *r* quadrant with its minor axis on line with the downslant.

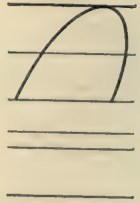


3. Analytic diagram.

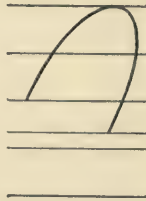


Composition

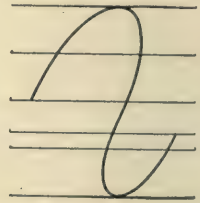
4. Begin at half-height of the letter and make, upward and to the right, a one and one-half height, upper half of the chirographic oval.



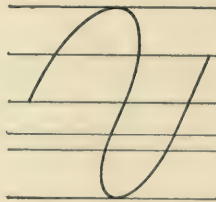
Continue, make, downward, a half-height, downslant line.



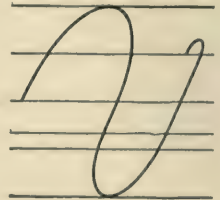
Continue, make a one-height, lower half of the chirographic oval.



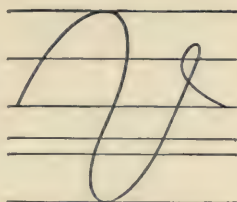
Continue, make, upward, a light, one and one-quarter height, downslant line.



Continue, make, upward and to the left, a quarter-height, upper small vertical loop.



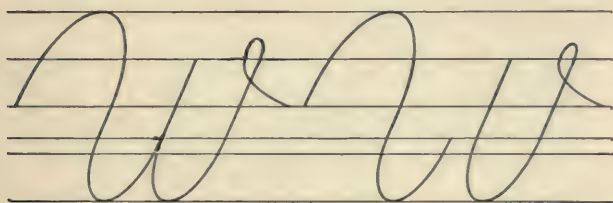
Conclude by making, downward and to the right, a three-quarter height, lower left, small r quadrant (the No. 9) with its minor axis on line with the downslant.



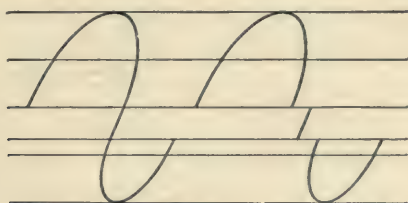
(12) THE CAPITAL LETTER *W*

Analysis

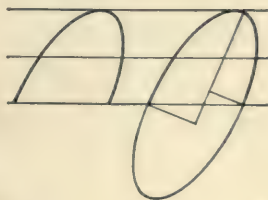
1. The capital letter *W* is composed of two parts, thus:



2. The first part consists of three portions, viz.:



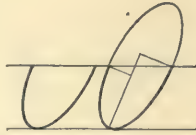
The first portion is a one and one-half height, upper half of the chirographic oval.



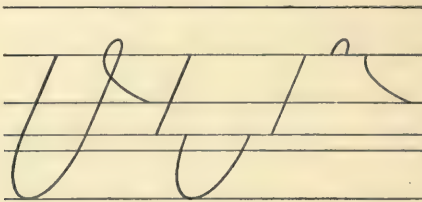
The second portion is a half-height, downslant line.



The third portion is a one-height, lower half of the chirographic oval.



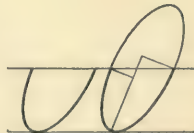
3. The second part consists of five portions, viz.:



The first portion is a one and one-quarter height, downslant line.



The second portion is a one-height, lower half of the chirographic oval.



The third portion is a one and one-quarter height, light, downslant line.



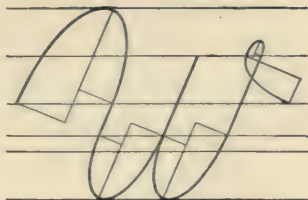
The fourth portion is a quarter-height, upper small vertical loop.



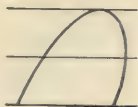
The fifth portion is a three-quarter height, lower left, small *r* quadrant (the No. 9) with its minor axis on line with the downslant.



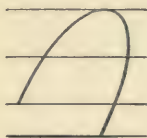
4. Analytic diagram.

*Composition*

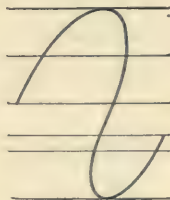
5. Begin at half-height of the letter and make a one and one-half height, upper half of the chirographic oval.



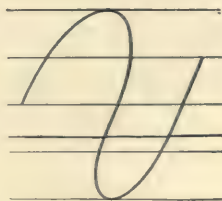
Continue, make, downward, a half-height, downslant line.



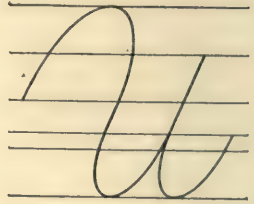
Continue, make a one-height, lower half of the chirographic oval.



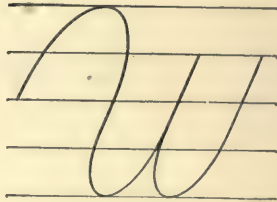
Lift and place the pen up, on line with the downslant, to three-fourths the height of the letter and make, downward, a one and one-quarter height, downslant line.



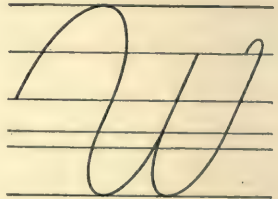
Continue, make a one-height, lower half of the chirographic oval.



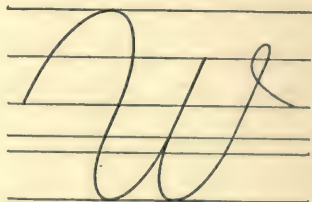
Continue, make, upward, a one and one-quarter height, light, downslant line.



Continue, make, upward and to the left, a quarter-height, upper small vertical loop.

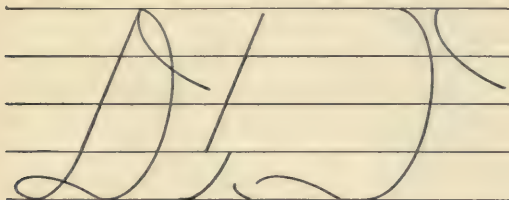


Conclude by making, downward and to the right, a three-quarter height, lower left, small *r* quadrant (the No. 9) with its minor axis on line with the downslant.

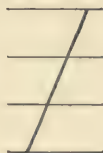


(13) THE CAPITAL LETTER *D**Analysis*

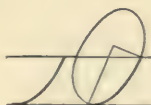
1. The capital letter *D* consists of one continuous line composed of six portions, thus:



2. The first portion is a two and one-quarter height, downslant line.



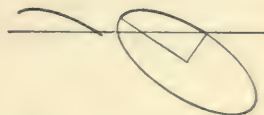
The second portion is a three-quarter height, lower right, No. 7 quadrant.



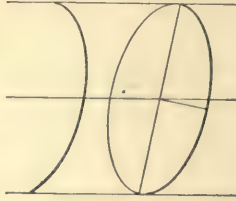
The third portion is a half-breadth, lower left quadrant of the small horizontal loop ellipse.



The fourth portion is a two and three-quarter breadth, upper right (?), main quadrant (the No. 2) with its minor axis on a slant of $33\frac{3}{4}$ degrees.



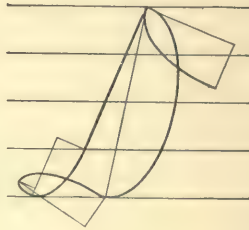
The fifth portion is a three-height, right half of the No. 4 ellipse with its major axis $11\frac{1}{4}$ degrees slant.



The sixth portion is a one and one-quarter height, lower left, (inverted) No. 4 quadrant with its minor axis on line with the downslant.



3. Analytic diagram.



Composition

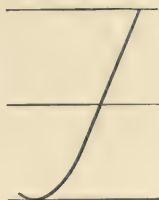
4. Begin at the height of the letter and make a two and one-quarter height, downslant line.



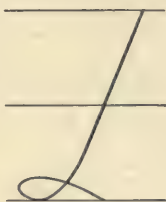
Continue, make, downward, a three-quarter height, lower right, No. 7 quadrant.



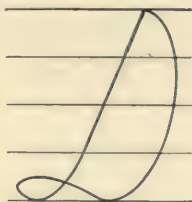
Continue, make, to the left, a half-breadth, lower left quadrant of the small horizontal loop ellipse.



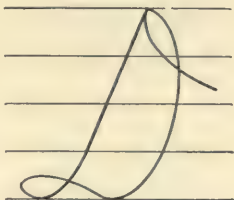
Continue, make, to the right, a two and three-quarter breadth, upper left, No. 2 quadrant with its minor axis on a slant of $33\frac{3}{4}$ degrees, the quadrant ending on the base line.



Continue, make, upward, a three-height, right half of the No. 4 ellipse with its major axis $11\frac{1}{4}$ degrees slant.

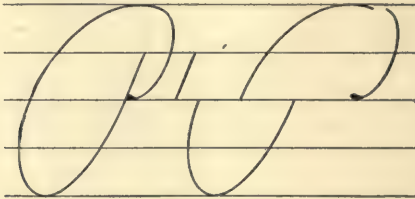


Conclude by making a one and one-quarter height, lower left, No. 4 quadrant with its minor axis on line with the downslant.



(14) THE CAPITAL LETTER *P**Analysis*

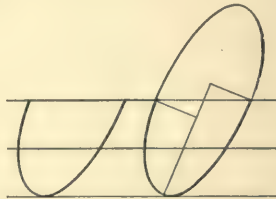
1. The capital letter *P* consists of one continuous line composed of four portions, thus:



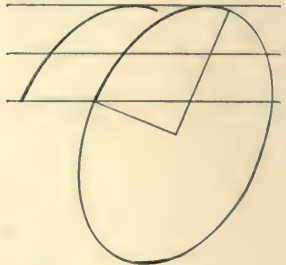
2. The first portion is a three-quarter height, downslant line.



The second portion is a one and one-half height, lower half of the oval.



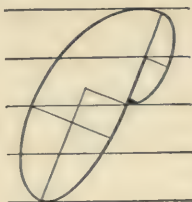
The third portion is a one and one-half height, small *a* quadrant.



The fourth portion is a one and one-half height, right half of the No. 4 ellipse, terminated in a pear-shaped tick.



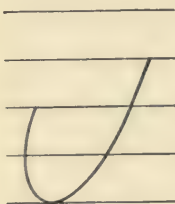
3. Analytic diagram.

*Composition*

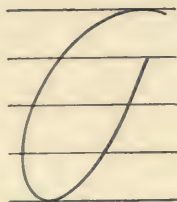
4. Begin at three-fourths height of the letter and make, downward, a three-quarter height, downslant line.



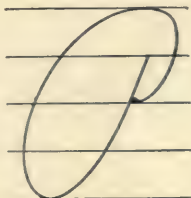
Continue, make, downward and to the left, a one and one-half height, lower half of the oval.



Continue, make, upward and to the right, a one and one-half height, small *a* quadrant.

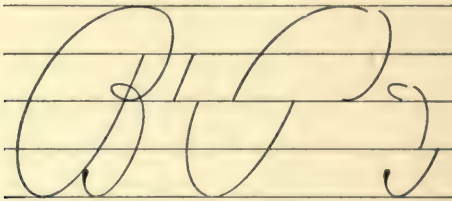


Conclude by making, downward, a one and one-half height, right half of the No. 4 ellipse, ending it in a pear-shaped tick heavy end to the left.



(15) THE CAPITAL LETTER *B**Analysis*

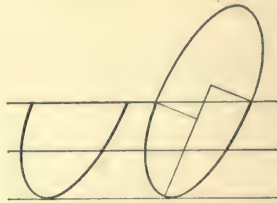
1. The capital letter *B* consists of one continuous line composed of seven portions, thus:



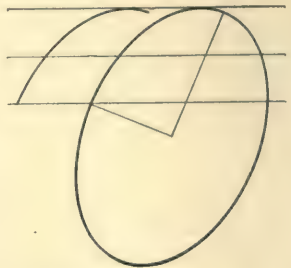
2. The first portion is a three-quarter height downslant line.



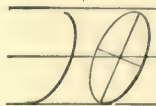
The second portion is a one and one-half height, lower half of the oval.



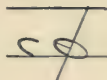
The third portion is a one and one-half height, upper left, small *a* quadrant.



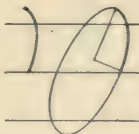
The fourth portion is a one and one-half height, right half of the No. 4 ellipse.



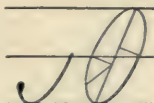
The fifth portion is a half-breadth, left small horizontal loop.



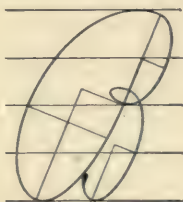
The sixth portion is a one-height, upper right, No. 4 quadrant.



The seventh portion is a three-quarter height, lower right quadrant and the lower half of a three-quarter height lower left quadrant of the oval, ending in a pear-shaped tick.



3. Analytic diagram.

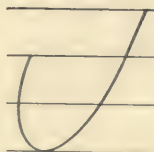


Composition

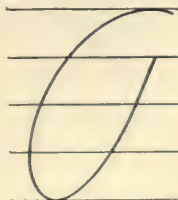
4. Begin at three-fourths height of the letter and make, downward, a three-quarter height, downslant line.



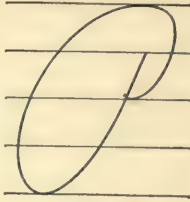
Continue, make, downward, a one and one-half height, lower half of the oval.



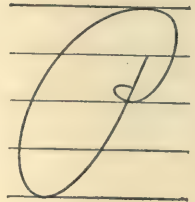
Continue, make, upward and to the right, a one and one-half height, upper left, small *a* quadrant.



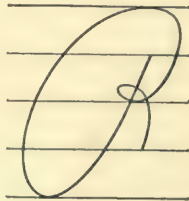
Continue, make, downward, a one and one-half height, right half of the No. 4 ellipse.



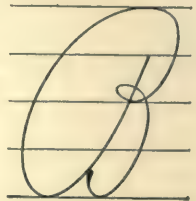
Continue, make, to the left and upward, a half-breadth, left small horizontal loop.



Continue, make, to the right and downward, a one-height, upper right, No. 4 quadrant

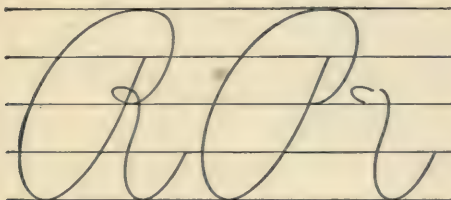


Conclude by making, downward and to the left, a three-quarter height, lower right quadrant and the lower half of a three-quarter height lower left quadrant of the oval, ending it in a pear-shaped tick heavy end upward.

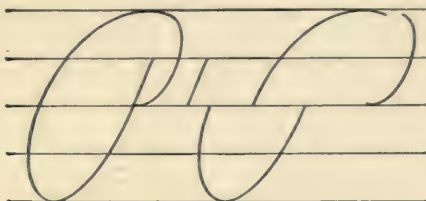


(16) THE CAPITAL LETTER *R**Analysis*

1. The capital letter *R* consists of one continuous line composed of three parts, thus:



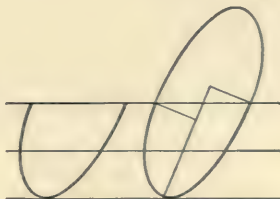
2. The first part consists of four portions, viz.:



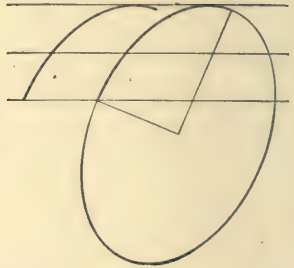
The first portion is a three-quarter height, down-slant line.



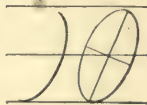
The second portion is a one and one-half height, lower half of the oval.



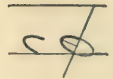
The third portion is a one and one-half height, upper left, small *a* quadrant.



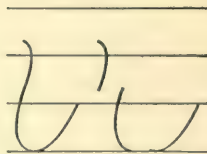
The fourth portion is a one and one-half height, right half of the No. 4 ellipse.



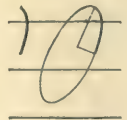
3. The second part consists of a half breadth, left small horizontal loop.



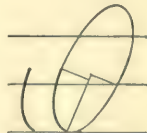
4. The third part consists of three portions. viz.:



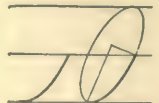
The first portion is a three-quarter height, upper right, No. 4 quadrant.



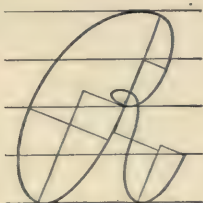
The second portion is a one-height, lower left, No. 4 quadrant.



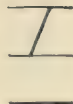
The third portion is a three-quarter height, lower right, connective quadrant (the No. 1).



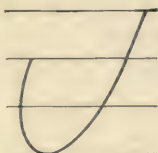
5. Analytic diagram.

*Composition*

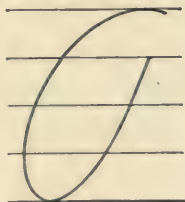
6. Begin at three-fourths height of the letter and make, downward, a three-quarter height, downslant line.



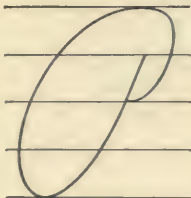
Continue, make, downward and to the left, a one and one-half height, lower half of the oval.



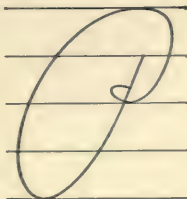
Continue, make, upward and to the right, a one and one-half height, upper left, small *a* quadrant.



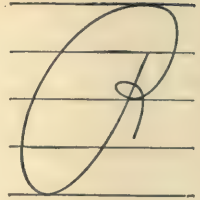
Continue, make, downward, a one and one-half height, right half of the No. 4 ellipse.



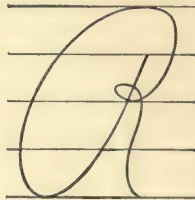
Continue, make, to the left and upward, a half-breadth, left small horizontal loop.



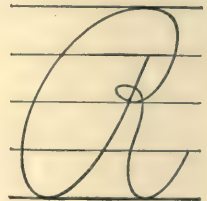
Continue, make, downward, a three-quarter height, upper right, No. 4 quadrant.



Continue, make, downward, a one-height, lower left, No. 4 quadrant.



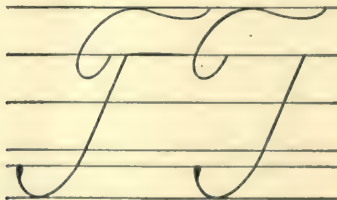
Conclude by making a three-quarter height, lower right, connective quadrant (the No. 1).



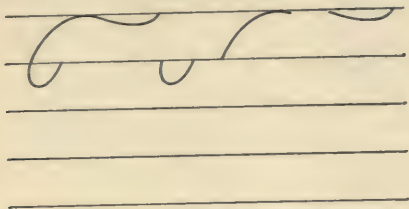
(17) THE CAPITAL LETTER *T*

Analysis

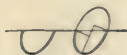
1. The capital letter *T* is composed of two parts, thus:



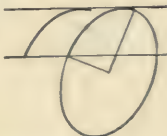
2. The first part consists of three portions, viz.:



The first portion is a three-eighth height, lower half of the broad oval.



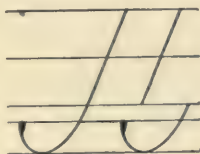
The second portion is a three-quarter height, small *a* quadrant.



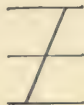
The third portion is a two-breadth, lower left (?), main quadrant (the No. 2) with its minor axis on line with the downslant.



3. The second part consists of two portions, viz.:



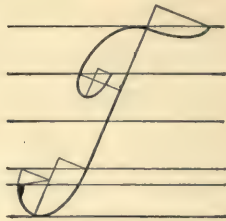
The first portion is a one and one-half height, downslant line.



The second portion is a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending in a pear-shaped tick.



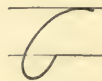
4. Analytic diagram.

*Composition*

5. Begin at three-fourths height of the letter and make, downward and to the left, a three-eighth height, lower half of the broad oval.



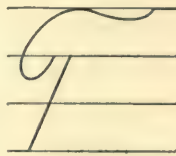
Continue, make, upward, a three-quarter height, small *a* quadrant.



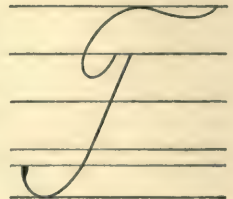
Continue, make, to the right, a two-breadth, lower left (?), main quadrant (the No. 2) with its minor axis on line with the downslant.



Lift and place the pen to the point of beginning the letter and one-half breadth to the right, and make, downward, a one and one-half height, downslant line.

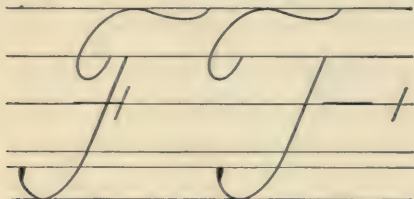


Conclude by making, downward, a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending it in a pear-shaped tick heavy end upward.

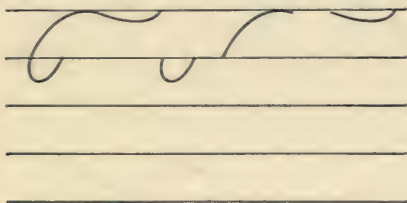


(18) THE CAPITAL LETTER *F**Analysis*

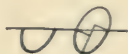
1. The capital letter *F* is composed of four parts, thus:



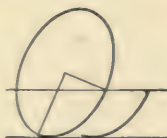
2. The first part consists of three portions, viz.:



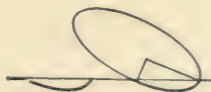
The first portion is a three-eighth height, lower half of the broad oval.



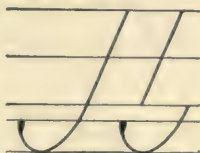
The second portion is a three-quarter height, small *a* quadrant.



The third portion is a two-breadth, lower left (?) main quadrant, (the No. 2) with its minor axis on line with the downslant.



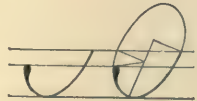
3. The second part consists of two portions, viz.:



The first portion is a one and one-half height, downslant line.



The second portion is a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending in a pear-shaped tick.

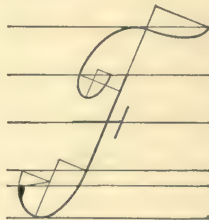


4. The third part consists of a one and one-half breadth, horizontal line.



5. The fourth part consists of a half height, downslant line, as in the preceding.

6. Analytic diagram.



Composition

7. Begin at three-fourths height of the letter and make, downward and to the left, a three-eighth height, lower half of the broad oval.



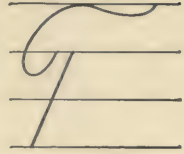
Continue, make, upward, a three-quarter height, small *a* quadrant.



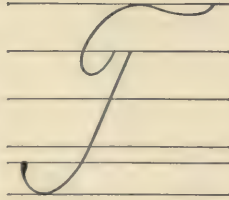
Continue, make, to the right, a two-breadth lower left (?), main quadrant (the No. 2) with its minor axis on line with the down slant.



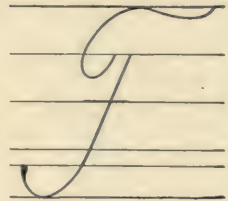
Lift and place the pen to the point of beginning the letter and one-half breadth to the right, and make, downward, a one and one-half height, downslant line.



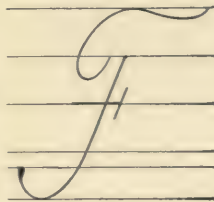
Continue, make, downward, a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending it in a pear-shaped tick heavy end upward.



Lift and place the pen up to half height of the letter and one breadth to the left of the downslant line, and make, to the right, crossing the down line, a one and one-half breadth, horizontal line.

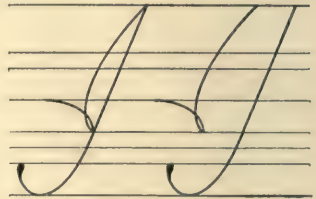


Lift and place the pen up, on line with the downslant, one-fourth of one height and conclude by making downward a half-height, downslant line.

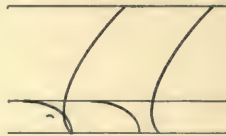


(19) THE CAPITAL LETTER *I**Analysis*

1. The capital letter *I* is composed of two parts, thus:



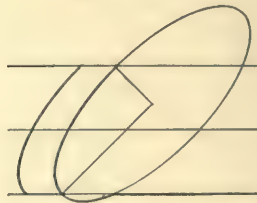
2. The first part consists of two portions, viz.:



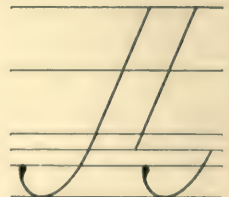
The first portion is a half height, upper right, horizontal oval quadrant (the No. 0).



The second portion is a two-height, inverted, upslant, connective quadrant (the No. 1).



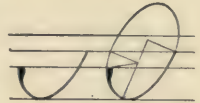
3. The second part consists of two portions, viz.:



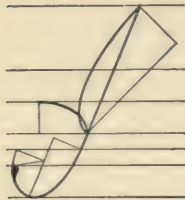
The first portion is a two and one-quarter height, downslant line.



The second portion is a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending in a pear-shaped tick.



4. Analytic diagram.

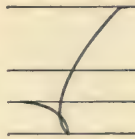


Composition

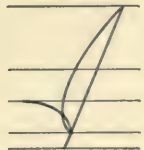
5. Begin at one and one-half height above the base line and make, to the right, a half-height, upper right, horizontal oval quadrant (the No. 0).



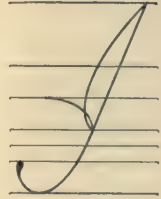
Continue, make, upward, an inverted, upslant, connective quadrant (the No. 1) extending to the height of the letter.



Make, downward, a two and one-quarter height, downslant line.



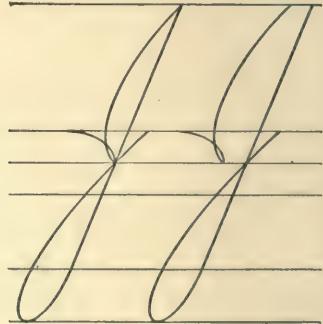
Conclude by making, downward and to the left, a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending it in a pear-shaped tick heavy end upward.



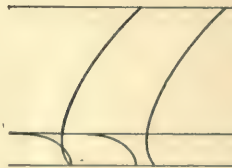
(20) THE CAPITAL LETTER J

Analysis

1. The capital letter *J* is composed of two parts, thus:



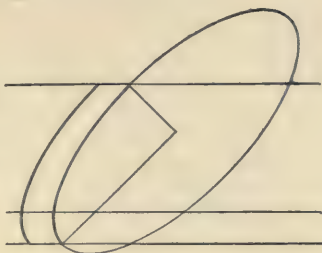
2. The first part consists of two portions, viz.:



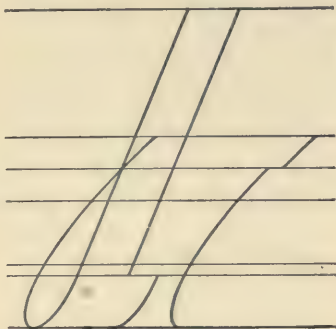
The first portion is a half-height, upper right, horizontal oval quadrant (the No. 0).



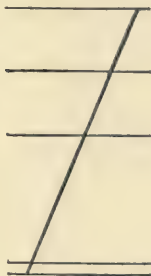
The second portion is a two and one-half height, inverted, upslant, connective quadrant (the No. 1).



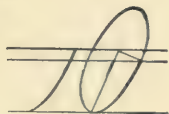
3. The second part consists of four portions, viz.:



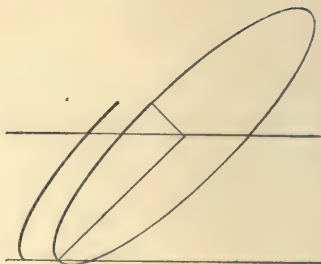
The first portion is a four and one-sixth height, downslant line.



The second portion is a five-sixths height, lower right, No. 3 quadrant.



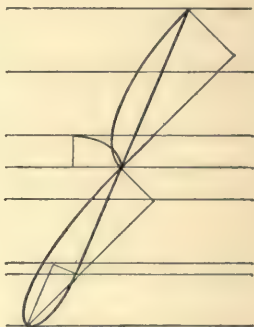
The third portion is a two and one-half height, lower left, loop quadrant.



The fourth portion is a half height, upslant line.



4. Analytic diagram.

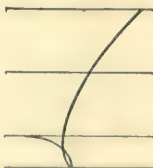


Composition

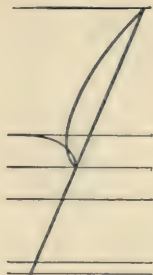
5. Begin at one height above the base line and make, to the right, a half-height, upper right, horizontal oval quadrant (the No. 0).



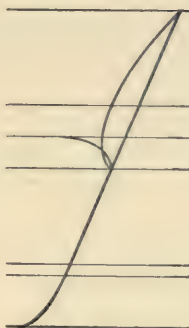
Continue, make, upward, an inverted, upslant, connective quadrant (the No. 1), extending to the height of the letter.



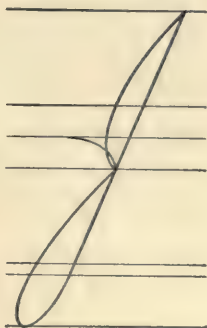
Make, downward, a four and one-sixth height, downslant line.



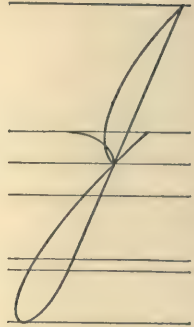
Continue, make, downward, a five-sixth height, lower right, No. 3 quadrant.



Continue, make, upward, a two and one-half height, lower left, loop quadrant.



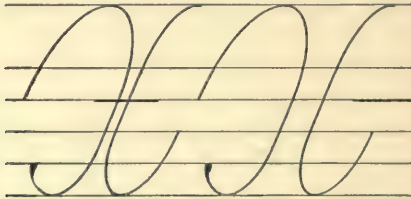
Conclude by making a half height, upslant line.



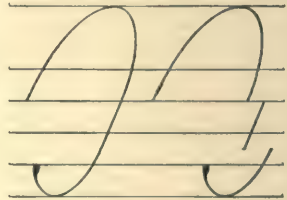
(21) THE CAPITAL LETTER X

Analysis

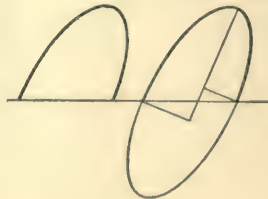
1. The capital letter X is composed of three parts, thus:



2. The first part consists of three portions, viz.:



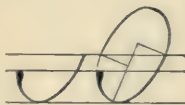
The first portion is a one and one-half height, upper half of the chirographic oval.



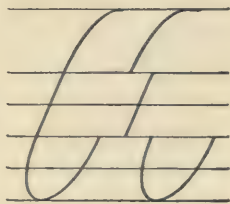
The second portion is a three-quarter height, downslant line.



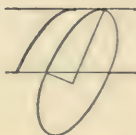
The third portion is a three-quarter height, lower right, and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending in a pear-shaped tick.



3. The second part also consists of three portions, viz.:



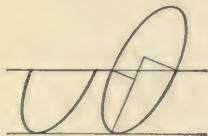
The first portion is a one-height, upper left, No. 3 quadrant.



The second portion is a one-height, downslant line.



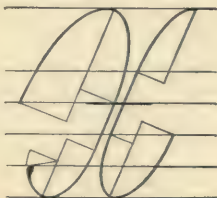
The third portion is a one-height, lower half of the chirographic oval.



4. The third part is a two-breadth, horizontal line.



5. Analytic diagram.

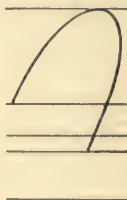


Composition

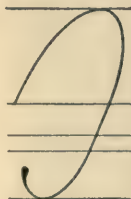
6. Begin at half-height of the letter and make a one and one-half height, upper half of the chirographic oval.



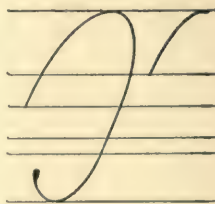
Continue, make downward a three-quarter height, downslant line.



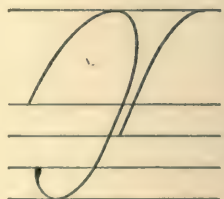
Continue, make, downward and to the left, a three-quarter height, lower right, and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending in a pear-shaped tick heavy and upward.



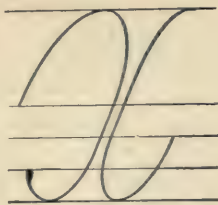
Lift and place the pen over the downslant line and up, on line with its slant, to the height of the letter and one and one-quarter breadth to the right, and make, downward, a one-height, upper left, No. 3 quadrant.



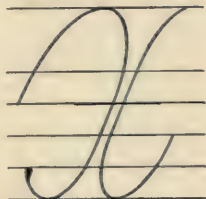
Continue, make downward a one-height, downslant line.



Continue make downward a one-height, lower half of the chirographic oval.



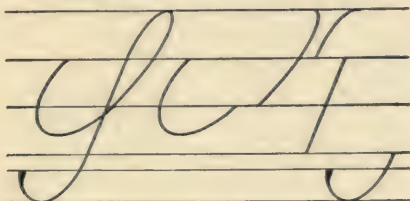
Lift and place the pen up, on the first downslant line, to half height of the letter, and a one-breadth to the left from the center of the letter, and conclude by crossing it with a two-breadth, horizontal line.



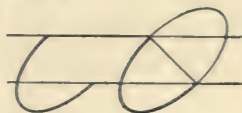
(22) THE CAPITAL LETTER S

Analysis

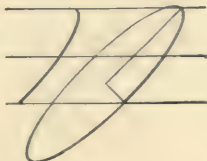
1. The capital letter *S* consists of one continuous line composed of five portions, thus:



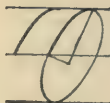
2. The first portion is a three-quarter height, lower half of an upslant, No. 4 ellipse.



The second portion is a one and one-half height, upper right, loop quadrant.



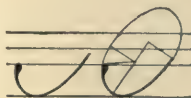
The third portion is a three-quarter height, upper left, No. 3 quadrant.



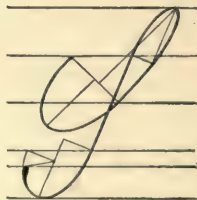
The fourth portion is a one and one-half height, downslant line.



The fifth portion is a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending in a pear-shaped tick.

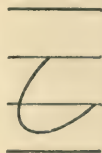


3. Analytic diagram.

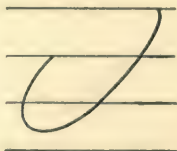


Composition

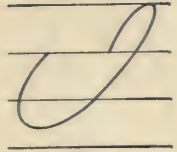
4. Begin at three-fourths height of the letter and make, downward and to the right, the lower half of an upslant, No. 4 ellipse, ending at half the height of the letter.



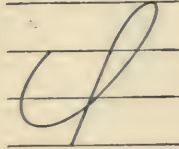
Continue, make, upward, a one and one-half height, upper right, loop quadrant.



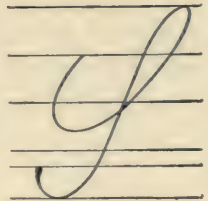
Continue, make, downward, a three-quarter height, upper left, No. 3 quadrant.



Continue, make, downward, a one and one-half height, downslant line.



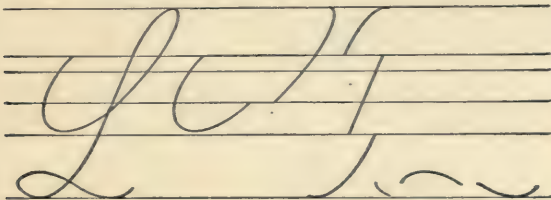
Conclude by making, downward, a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending it in a pear-shaped tick heavy end upward.



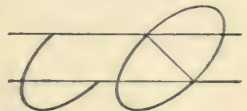
(23) THE CAPITAL LETTER *L*

Analysis

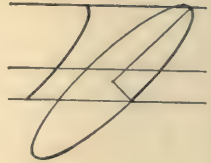
1. The capital letter *L* consists of one continuous line composed of eight portions, thus:



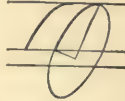
2. The first portion is a three-quarter height, lower half of an upslant No. 4 ellipse.



The second portion is a one and one-half height, upper right, loop quadrant.



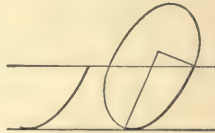
The third portion is a three-quarter height, upper left, No. 3 quadrant.



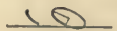
The fourth portion is a one and one-quarter height, downslant line.



The fifth portion is a one height, lower right, No. 7 quadrant.



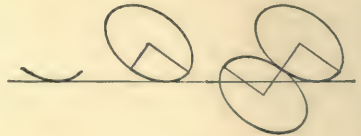
The sixth portion is a half-breadth, lower left quadrant of the small horizontal loop ellipse.



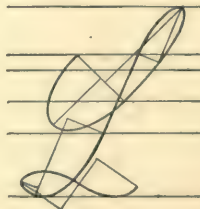
The seventh portion is a one and three-quarter breadth, upper left, horizontal oval quadrant (the No. 0) with its minor axis on a 35-degree slant.



The eighth portion is a one and three-quarter breadth, lower right quadrant of the same oval, with its minor axis on the same slant.

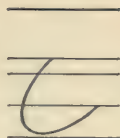


3. Analytic diagram.

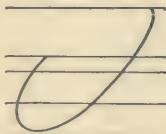


Composition

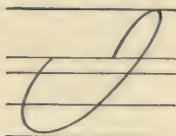
4. Begin at three-fourths height of the letter and make, downward and to the right, the lower half of an upslant, No. 4 ellipse, ending at half the height of the letter.



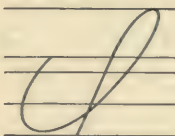
Continue, make, upward, a one and one-half height, upper right, loop quadrant.



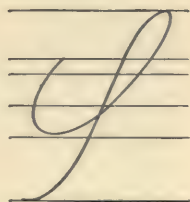
Continue, make, downward, a three-quarter height, upper left, No. 3 quadrant.



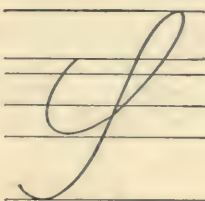
Continue, make, downward, a one and one-quarter height, downslant line.



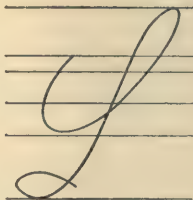
Continue, make, downward, a one height, lower right, No. 7 quadrant.



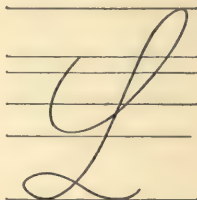
Continue, make, to the left, a one-half breadth, lower left quadrant of the small horizontal loop ellipse, with its minor axis on line with the downslant.



Continue, make, to the right, a one and three-quarter breadth, upper left horizontal oval quadrant (the No. 0) with its minor axis on a 35-degree slant.



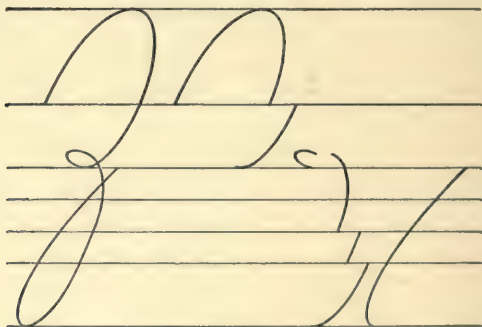
Conclude by making, to the right, the lower right quadrant of the same oval with its minor axis on the same slant.



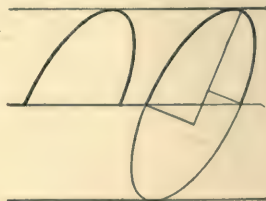
(24) THE CAPITAL LETTER Z

Analysis

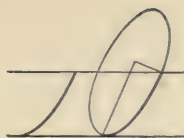
1. The capital letter Z consists of one continuous line composed of seven portions, thus:



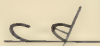
2. The first portion is a one and one-half height, upper half of the chirographic oval.



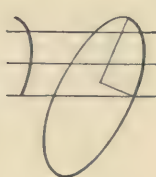
The second portion is a one-height, lower right, No. 3 quadrant.



The third portion is a half breadth, left small horizontal loop.



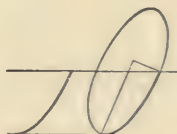
The fourth portion is a one and one-quarter height, upper right, No. 4 quadrant.



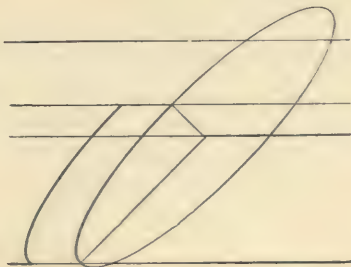
The fifth portion is a half-height, downslant line.



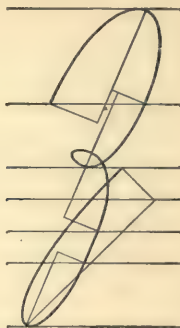
The sixth portion is a one-height, lower right, No. 3 quadrant.



The seventh portion is a two and one-half height, lower left, loop quadrant (the No. 6).



3. Analytic Diagram.

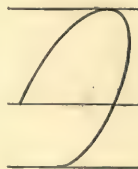


Composition

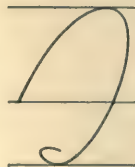
4. Begin at half-height of a capital letter and make, upward and to the right, a one and one-half height, upper half of the chirographic oval.



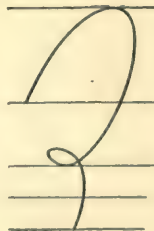
Continue, make, downward, a one height, lower right, No. 3 quadrant.



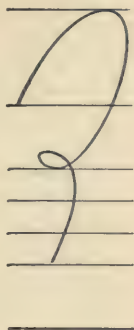
Continue, make, to the left and upward, a half breadth, left small horizontal loop.



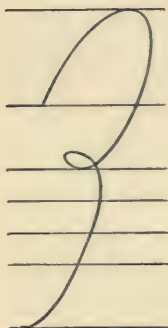
Continue, make, to the right and downward, a one and one-quarter height, upper right, No. 4 quadrant.



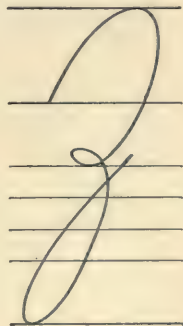
Continue, make, downward, a half height, downslant line.



Continue, make, downward and to the left, a one-height, No. 3 quadrant.

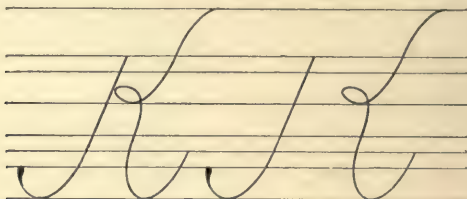


Conclude by making, upward, a two and one-half height, lower left loop quadrant (the No. 6).

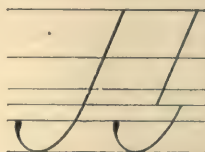


(25) THE CAPITAL LETTER *K**Analysis*

1. The capital letter *K* is composed of two parts, thus:



2. The first part consists of two portions; viz:



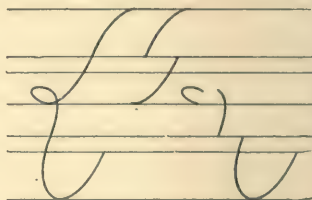
The first portion is a one and one-half height, downslant line.



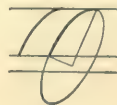
The second portion is a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending in a pear-shaped tick.



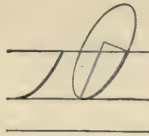
3. The second part consists of five portions, viz.:



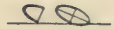
The first portion is a three-quarter height, upper left, connective quadrant (the No. 1).



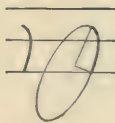
The second portion is a three-quarter height, lower right, connective quadrant (the No. 1).



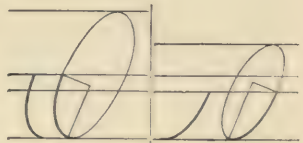
The third portion is a half-breadth, left small horizontal loop.



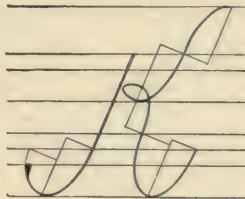
The fourth portion is a three-quarter height, upper right, main quadrant (the No. 2).



The fifth portion is a one-height, lower left, No. 4 quadrant and a three-quarter height lower right, connective quadrant (the No. 1).



4. Analytic diagram.

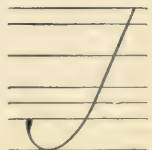


Composition

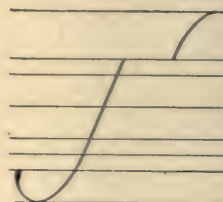
5. Begin at two and one-fourth heights above the base line and make, downward, a one and one-half height, downslant line.



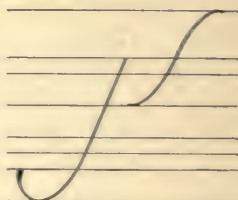
Continue, make, downward, a three-quarter height, lower right and the lower two-thirds of a three-quarter height, lower left quadrant of the broad oval, ending it in a pear-shaped tick heavy end upward.



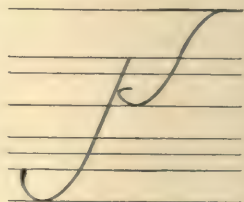
Lift and place the pen up, on line with the downslant line, to the height of the letter and two and one-half breadths to the right and make, downward, a three-quarter height, upper left, connective quadrant (the No. 1).



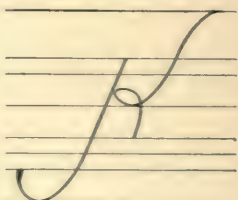
Continue, make, downward, a three-quarter height, lower right, connective quadrant (the No. 1).



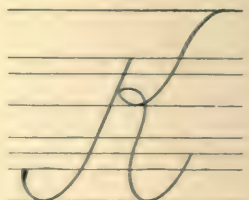
Continue, make, to the left and upward, touching the downslant line, a half breadth, left small horizontal loop, with its minor axis on line with the downslant.



Continue, make, downward, a three-quarter height, upper right, main quadrant (the No. 2).

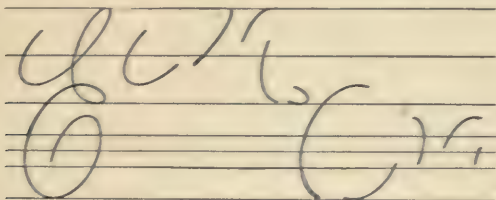


Conclude by making a one-height lower left, No. 4 quadrant and a three-quarter height, lower right, connective quadrant (the No. 1).

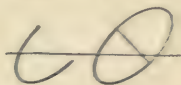


(26) THE CAPITAL LETTER *E**Analysis*

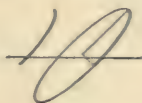
1. The capital letter *E* consists of one continuous line, composed of ten portions, thus:



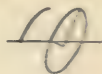
2. The first portion is a half-height, lower half of an upslant, No. 4 ellipse.



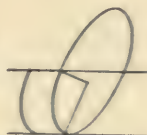
The second portion is a seven-eighths height, upper right, loop quadrant.



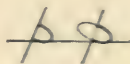
The third portion is a half-height, upper left, No. 3 quadrant.



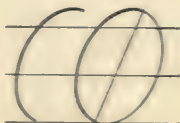
The fourth portion is a one-height, lower left, No. 4 quadrant.



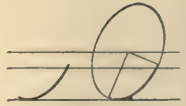
The fifth portion is a half-breadth, right small horizontal loop.



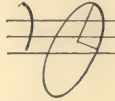
The sixth portion is a one and three-quarter height, left half of the horizontal oval (the No. 0) with its major axis on line with the downslant.



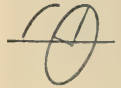
The seventh portion is a half-height, lower right, small *a* quadrant.



The eighth portion is a three-quarter height, upper right, No. 4 quadrant.



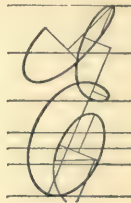
The ninth portion is a half-height, upper left, (inverted) No. 4 quadrant.



The tenth portion is a quarter height, upper part of a three-quarter height, lower left, No. 8 quadrant.

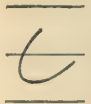


3. Analytic diagram.

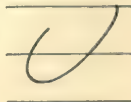


Composition

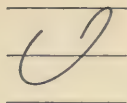
4. Begin at seven-eighths height of the letter and make, downward and to the right, a half-height, lower half of an upslant, No. 4 ellipse.



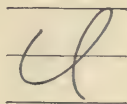
Continue, make, upward, a seven-eighths height, upper right, loop quadrant.



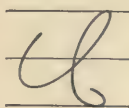
Continue, make, downward, a half-height, upper left, No. 3 quadrant.



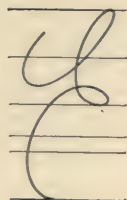
Continue, make, downward, a one-height, lower left, No. 4 quadrant.



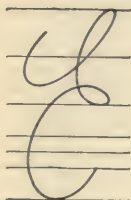
Continue, make, to the right and upward, a half-breadth, right small horizontal loop.



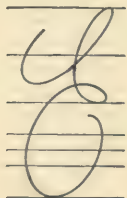
Continue, make, downward, a one and three-quarter height, left half of the horizontal oval (the No. 0) with its major axis on line with the downslant.



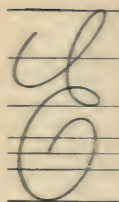
Continue, make, to the right and upward, a half-height, lower right, small *a* quadrant.



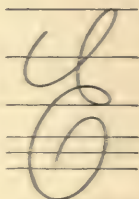
Continue, make, upward, a three-quarter height, upper right, No. 4 quadrant.



Continue, make, to the left and downward, a half-height, upper left (inverted), No. 4 quadrant.



Conclude by making, downward, the quarter height, upper part of a three-quarter height, lower left, No. 8 quadrant.



NOTE. As the capital letter *E* contains an upper loop, a small horizontal loop, and an oval spiral, the many turns make the letter very complicated; but, as was stated in the note page 151, the author is not to blame for that. He has not devised, has not *originated*, the letters—he has analyzed them as he found them.

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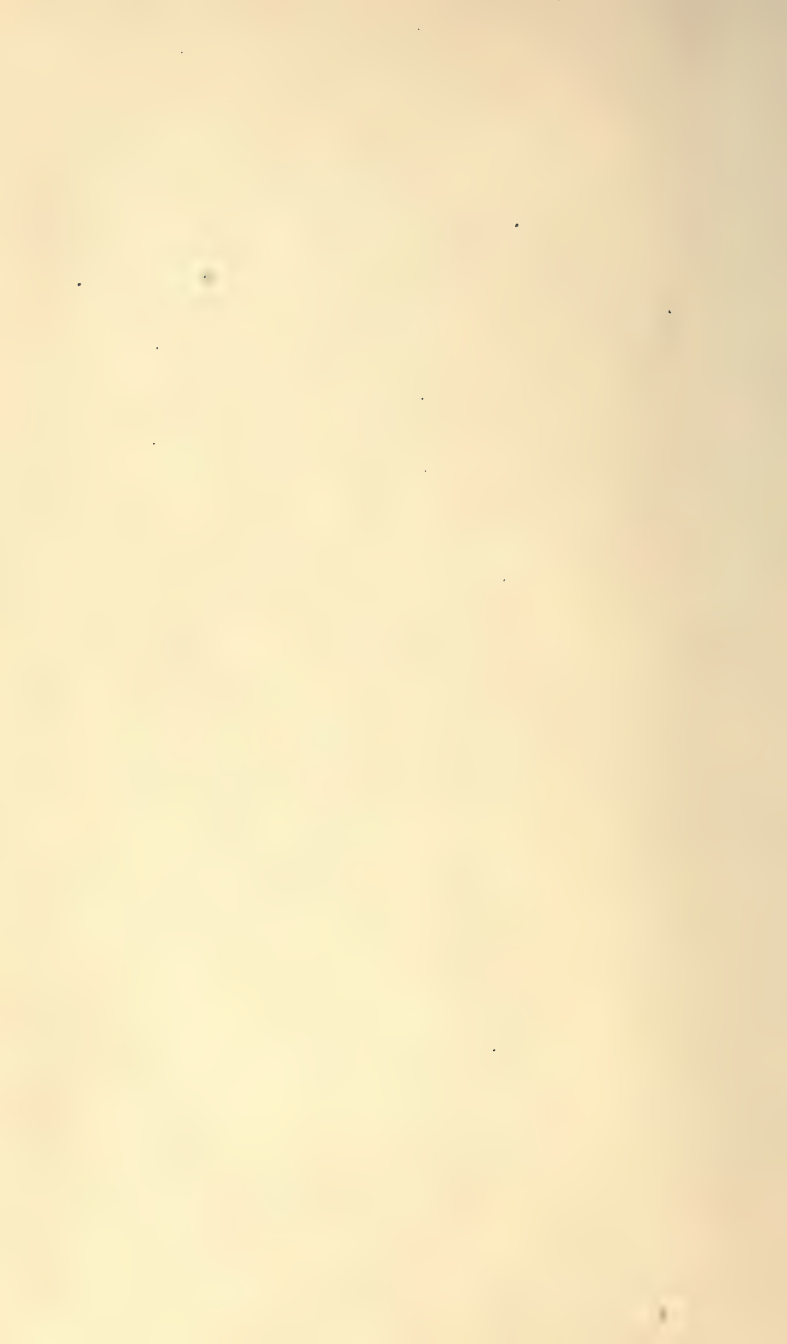
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